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COLORADO RIVER BASIN WATER QUALITY CONTROL PROJECT. PROGRAM REVIEW. WASHINGTON, D.C. FEBRUARY 6-7, 1963

PUBLIC HEALTH SERVICE, DENVER, COLORADO

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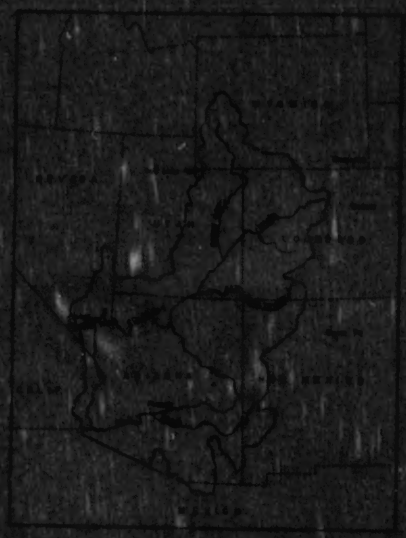
Washington, D. C.
February 6-7, 1963

Colorado River Basin Water Quality Control Project



U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Public Health Service
Bureau of State Services
Division of Water Supply and Pollution Control
Region VIII
Denver, Colorado

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16. Abstracts In an interim program review of the Colorado River Basin Water Quality Control Project in progress, project organization and management are presented. Accomplishments to date and work anticipated for the rest of the fiscal year with respect to each of the items are detailed in activity reports. Initially the project mainly emphasized investigations related to pollution caused by uranium milling operations. Considerable engineering field work was devoted to this problem, and field activities were expanded to fill the requirements of the water quality management program and to examine existing nonradiological problem areas. These activities are described in detail. Salinity then became the most significant water quality problem in the basin. At this point it is estimated that the project is 35 per cent completed. A bibliography of project reports and publications is included.

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17b. Identifiers/Open-Ended Terms
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Water pollution
*Water pollution control
Water pollution effects
Water pollution economics
*Water quality
Water quality data
Salinity
River basin development

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INTRODUCTION

This Project was initiated by the Public Health Service on July 1, 1960, following an Interstate Enforcement Conference held in January of that year in the matter of the pollution of the interstate waters of the Colorado River and its tributaries. Subsequently, two additional sessions of the Conference have been held: 1) in Las Vegas, Nevada, in May 1961; and 2) in Salt Lake City, Utah, in May 1962. It is expected that a fourth Conference session will be held in May of this year, probably at La Jolla, California.

At the first session of the Conference the principal conclusions which the Conferees reached were:

1) The material presented at the Conference indicated that further investigation and study is needed to define the type of interstate pollution problems which may exist;

2) That such investigation and study should cover:

   a) domestic and municipal wastes, (current and potential)

   b) wastes resulting from the harvesting and processing of the timber resources of the region, (current and potential);

   c) wastes from coal and oil shale deposit developments; (current and potential);

   d) industrial wastes, including wastes from food processing and similar industries, (current and potential);

   e) deterioration of water quality by agricultural uses (including fertilizers and insecticides) and erosion;

   f) pollution caused by radioactive wastes.

3) That such study should include the determination of specific pollutants and their concentration and include radioactive, chemical, biological, and microbiological studies, and an engineering analysis of the existing waste treatment facilities of the Basin and their effectiveness;

4) That such investigation and study should be directed toward methods of securing the best possible water quality for multiple water use, including domestic, industrial, agricultural, fish and wildlife, recreation, hydroelectric development, and the protection of public health;

5) That the initial stages of such study and investigation should be directed to determining the most critical and pressing problems in order that priorities may be established for developing data and securing needed remedial action on such problems;

6) That the Public Health Service would undertake, in cooperation with the State water pollution control agencies of Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming, and other Federal agencies, the above-described pollution control study of the Colorado River and its tributaries within the limits of resources available to it; and

7) That as soon as possible after the completion of this Conference, the Public Health Service would present a detailed proposed plan of such study and investigation to the State and Federal agencies concerned for their review and comment; and that final plans of such study and investigation would be made available to all State and Federal agencies concerned.

At the third session of the Conference, the principal conclusions reached were:

1) Cognizance was taken of the progress made as a result of efforts of the Public Health Service, the Atomic Energy Commission, and industry in the development of standards for construction of holding lagoons and dikes at uranium mills; on the development of a radium monitoring network, and an alerting system for accidental spills from uranium mills.

2) A level of one micromicrocurie per liter or less of dissolved radium-226 prevails in the waters of the Basin, except for the two exceptions mentioned in paragraph 6. Cognizance was also taken of the marked improvement of the water quality of the Animas River which, at the Colorado and New Mexico State line, has a level of dissolved radium-226 well below one micromicrocurie per liter.

3) Sediment surveys indicate a natural background level of 1.3 micromicrocuries of radium-226 per gram of sediment with variations from this average being slight. The survey indicates that the residual contamination of the Basin waters by radium is now very slight.

4) Bottom animal studies in the Animas River below the Vanadium Corporation of America's uranium mill at Durango, Colorado, showed large numbers of clean water organisms in all sections and indicated that the river in this area is now biologically normal. Bottom animal studies of the San Miguel River below the Union Carbide Nuclear Company installation at Uravan, Colorado, showed large numbers of clean water organisms. From below this mill to the mouth of the Dolores River there was a drastic reduction in the number of these organisms. As a result of tests this is attributable primarily to the chemical toxicity of waste discharged by the Uravan mill, and not to their radioactivity.

5) Discharges from the Wellton-Mohawk Irrigation District contribute substantially to the deterioration of chemical quality of the Colorado River at Yuma. The City of Yuma has made a temporary arrangement for domestic water supply from the Yuma Main Canal, which is not a permanent solution to Yuma's domestic water supply problem. Silt from the All-American Canal desilting basin may be a major detriment to recreational uses of the Colorado River between Imperial Dam and Morelos Dam. Discharge of raw sewage from Yuma appears to have caused a substantial increase in coliform count below the outfall of that city.

6) Problems still exist with reference to certain areas, Montezuma Creek below Monticello, Utah, and the San Miguel-Dolores River system below Uravan, Colorado, which still have a level of dissolved radium-226 above one micromicrocurie per liter. Considerable effort is being made by the Atomic Energy Commission in the Monticello area and by Union Carbide Nuclear Company at Uravan to improve these situations and to bring them within the limits demonstrated to be reasonably feasible on the Colorado River. There are also indications of a relatively high level radium content of crops like alfalfa and grasses directly related to high levels of radium in top soil.

7) Progress has been made in developing the program for long-range water quality management. This includes:

   a) Completion of the first computer analysis of chemical water quality data.

   b) Development of basic demographic data in connection with an economic base study for the Basin.

   c) The substantial completion of the inventory of municipal and industrial water uses and waste discharges.

   d) Planning studies on the upper main stem of the Colorado River, the Green River, and their sub-basins to provide basic data for development of comprehensive programs.

During FY 1963, Project activities have been directed principally toward accomplishment of the activities requested at the third session of the Conference. These are as follows:

1) Develop comprehensive programs for water quality control with emphasis on the upper main stem of the Colorado River and Green River sub-basins.

2) Collect and correlate required data and proceed with economic studies.

3) Evaluate results of crop surveys with reference to radiological content.

4) Conduct limited investigations into radium uptakes by stream biota, including fish.

5) Conduct exploratory investigations of pollution from recreational boating.

6) Investigate quality of water in Lake Mead and its suitability for domestic water supplies.

7) Conduct limited sampling of uranium mill effluents and environmental media to ascertain levels of lead-210 in view of its possible importance as a water contaminant and its low maximum permissible concentration.

8) Further study and attempt to arrive at an acceptable solution for the problem of salinity caused by discharges from the Wellton-Mohawk reservoir.

9) Complete development of standards for construction of holding lagoons and dikes at uranium mills in cooperation with the Atomic Energy Commission and the State water pollution control agencies.

10) Complete development of an alerting system for accidental spills from uranium mills, in cooperation with the Atomic Energy Commission and the State water pollution control agencies.

11) Investigate the Monticello, Utah area for hazards from radioactive contamination.

12) Investigate further the radiological and toxic chemical condition of waters at Uravan, Colorado.

13) Complete the radium monitoring network and continue radium monitoring.

14) Continue on a limited basis monitoring of radiological content of sediments.

Accomplishments to date and work anticipated for the balance of FY 1963, with respect to each of these items, are detailed in the activity reports immediately following, as well as proposed plans for FY 1964, where appropriate.

In addition, activities have been initiated in connection with the preparation of reports concerning the need for and value of storage in proposed Federal reservoirs for the purpose of water quality control. Five such reports have been completed under reimbursement agreements with the Bureau of Reclamation; a sixth report is currently being prepared for the Corps of Engineers.

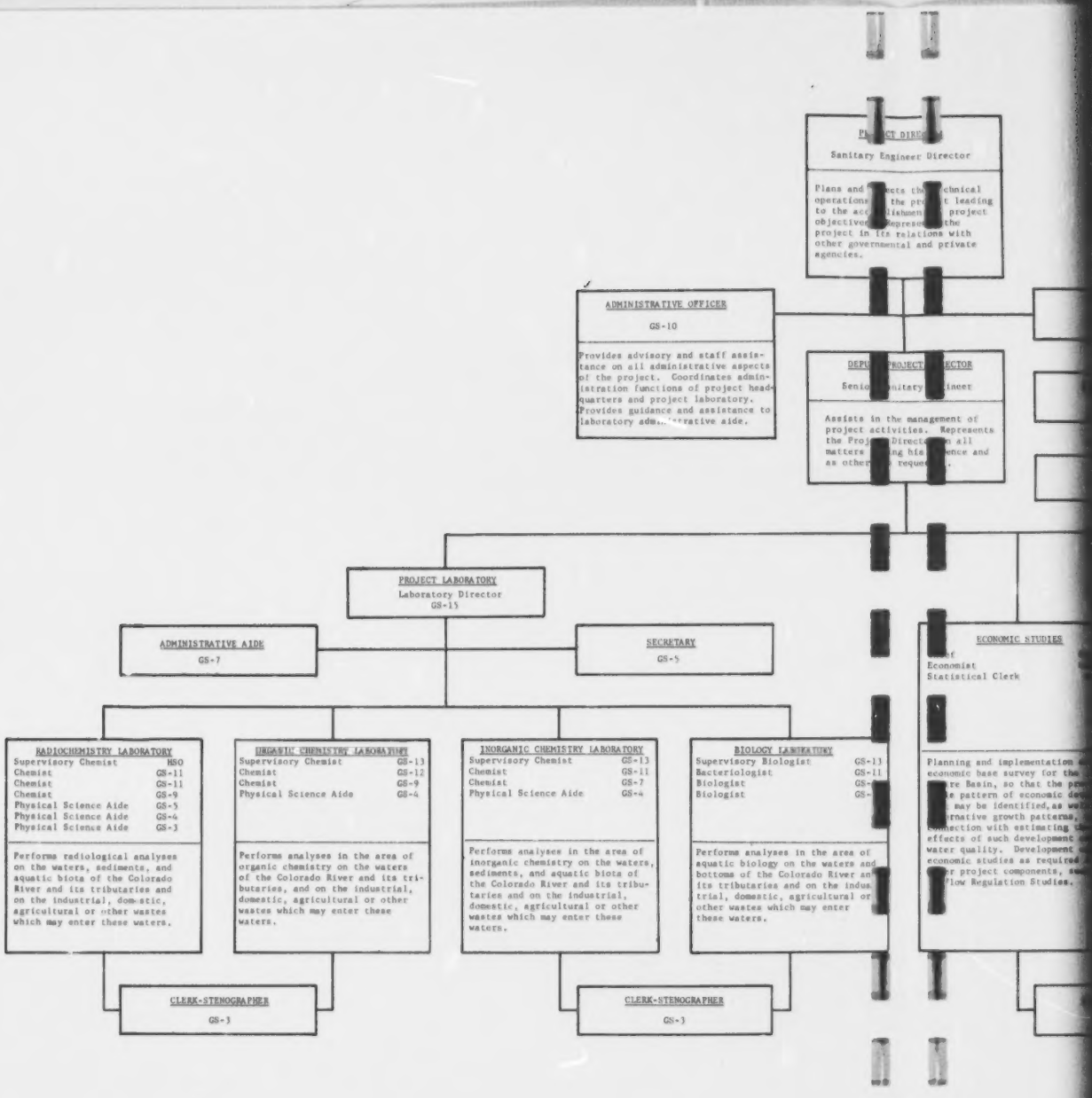
As indicated at the first Conference session, the Project has two principal objectives: 1) "A determination of the specific pollutants and their concentrations which now exist or which may reasonably be expected to exist in the immediate future resulting from various water uses within the Basin, and the establishment of priorities for developing data on, and securing needed remedial action at the most critical and pressing

problem areas."; and 2) "A determination of methods for securing the best possible water quality for multiple water use and the development of a comprehensive plan and program of water quality control for multiple water use within the Basin..." At the time the Project was initiated, the most critical and pressing problem in the Basin appeared to result from pollution caused by uranium milling operations. Accordingly, principal emphasis was placed on investigations related to this problem. It has been found, as reported at the third Conference session, that cooperative efforts by the Public Health Service, Atomic Energy Commission, and the uranium milling industries have brought this problem under control. It is felt that the Project's principal effort in this connection should now be reduced to a monitoring and surveillance-type operation on a Basin-wide basis.

The most significant problem now existing in the Colorado River Basin with respect to water quality is that of salinity. Information concerning salinity levels has been developed for certain specific areas to date. It is felt that the Project should now expand its activities with respect to this type of pollution so as to consider it on a Basinwide basis with a view toward identifying contributors of salinity, evaluating their significance, and developing proposals for control of salinity contribution to the waters of the Colorado River and its tributaries. We have accordingly developed plans for a substantial investigative effort directed toward the accomplishment of these purposes.

We also feel that we are now at the stage where, in line with the original objectives of the Project, we can initiate additional activities to define the types of interstate pollution problems, in addition to radiological, which may exist in the Basin.

With respect to the second principal Project objective, the development of a water quality management program for the Basin, we have undertaken a number of work items associated with this activity on a Basinwide basis, as well as others associated particularly with the Green River and Upper Main-Stem Sub-Basins. These are described in detail in the accompanying material.

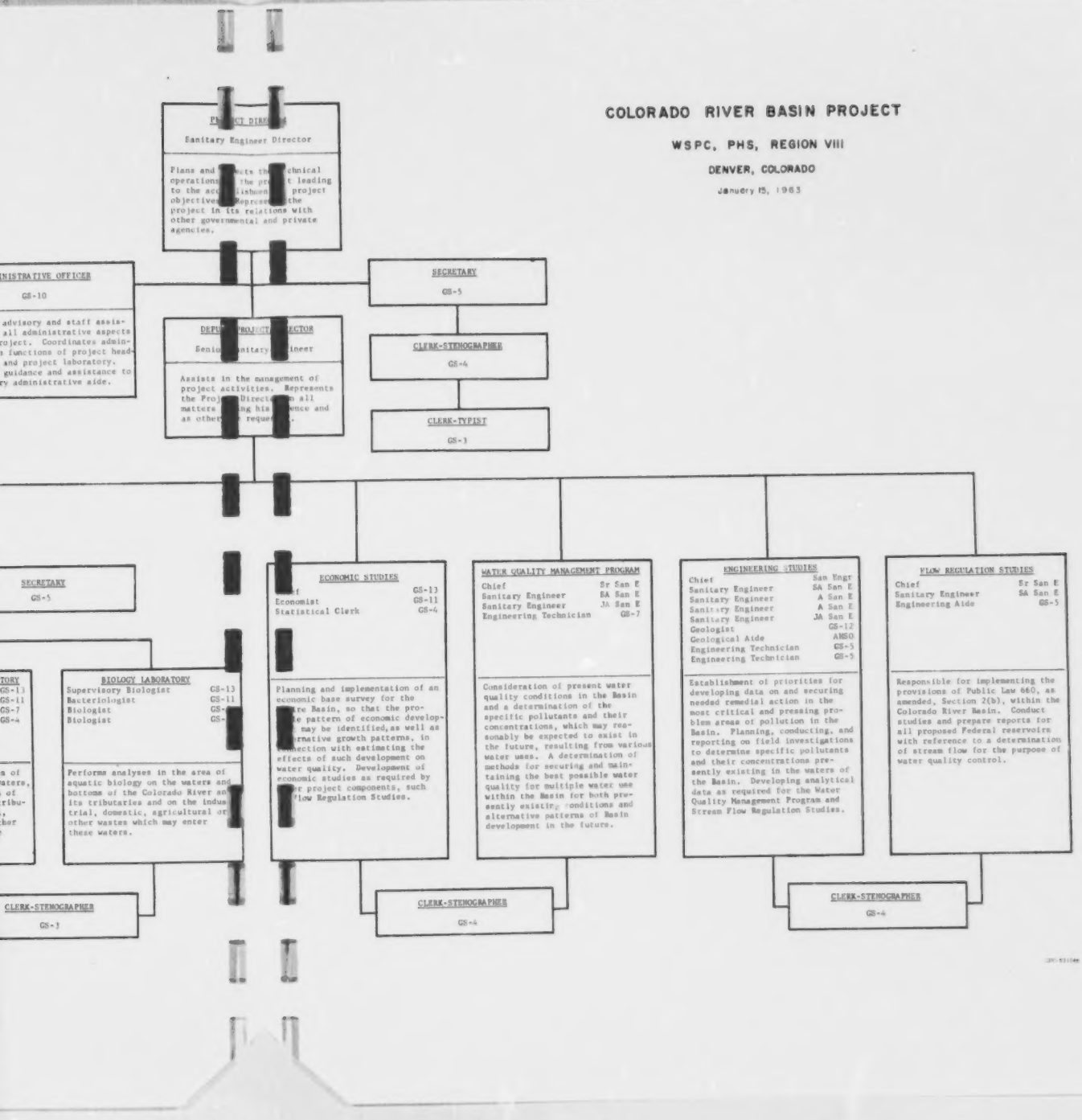

Sanitary Engineer Director
Plans and directs the technical operations of the project leading to the accomplishment of project objectives. Represents the project in its relations with other governmental and private agencies.
ADMINISTRATIVE OFFICER
GS-10
Provides advisory and staff assistance on all administrative aspects of the project. Coordinates administration functions of project headquarters and project laboratory. Provides guidance and assistance to laboratory adm.. "rative aide.
Senior Sanitary Engineer
Assists in the management of project activities. Represents the Project Director on all matters requiring his presence and as otherwise requested.
PROJECT LABORATORY
Laboratory Director
GS-15
ADMINISTRATIVE AIDE
GS-7
SECRETARY
GS-5
ECONOMIC STUDIES
Economist
Statistical Clerk
Planning and implementation of economic base survey for the Basin, so that the pattern of economic development may be identified, as well as alternative growth patterns, in connection with estimating the effects of such development on water quality. Development of economic studies as required for project components, such as Flow Regulation Studies.
RADIOCHEMISTRY LABORATORY
Supervisory Chemist HSO
Chemist GS-11
Chemist GS-11
Chemist GS-9
Physical Science Aide GS-5
Physical Science Aide GS-4
Physical Science Aide GS-3
Performs radiological analyses on the waters, sediments, and aquatic biota of the Colorado River and its tributaries and on the industrial, domestic, agricultural or other wastes which may enter these waters.
ORGANIC CHEMISTRY LABORATORY
Supervisory Chemist GS-13
Chemist GS-12
Chemist GS-9
Physical Science Aide GS-4
Performs analyses in the area of organic chemistry on the waters of the Colorado River and its tributaries, and on the industrial, domestic, agricultural or other wastes which may enter these waters.
INORGANIC CHEMISTRY LABORATORY
Supervisory Chemist GS-13
Chemist GS-11
Chemist GS-7
Physical Science Aide GS-4
Performs analyses in the area of inorganic chemistry on the waters, sediments, and aquatic biota of the Colorado River and its tributaries and on the industrial, domestic, agricultural or other wastes which may enter these waters.
BIOLOGY LABORATORY
Supervisory Biologist GS-13
Bacteriologist GS-11
Biologist GS-
Biologist GS-
Performs analyses in the area of aquatic biology on the waters and bottoms of the Colorado River and its tributaries and on the industrial, domestic, agricultural or other wastes which may enter these waters.
CLERK-STENOGRAPHER
GS-3
CLERK-STENOGRAPHER
GS-3

COLORADO RIVER BASIN PROJECT

WSPC, PHS, REGION VIII

DENVER, COLORADO

January 15, 1963


Sanitary Engineer Director
Plans and directs the technical operations of the project leading to the accomplishment of project objectives. Represents the project in its relations with other governmental and private agencies.
SECRETARY
GS-5
CLERK-STENOGRAPHER
GS-4
CLERK-TYPIST
GS-3
ADMINISTRATIVE OFFICER
GS-10
advisory and staff assistance all administrative aspects project. Coordinates administrative functions of project headquarters and project laboratory. guidance and assistance to administrative aide.
DEPUTY PROJECT DIRECTOR
Senior Sanitary Engineer
Assists in the management of project activities. Represents the Project Director on all matters requiring his presence and as otherwise requested.
SECRETARY
GS-5
ECONOMIC STUDIES
Economist GS-11
Statistical Clerk GS-4
Planning and implementation of an economic base survey for the Basin, so that the probable pattern of economic development may be identified, as well as alternative growth patterns, in connection with estimating the effects of such development on water quality. Development of economic studies as required by other project components, such as Flow Regulation Studies.
WATER QUALITY MANAGEMENT PROGRAM
Chief Sr San E
Sanitary Engineer SA San E
Sanitary Engineer JA San E
Engineering Technician GS-7
Consideration of present water quality conditions in the Basin and a determination of the specific pollutants and their concentrations, which may reasonably be expected to exist in the future, resulting from various water uses. A determination of methods for securing and maintaining the best possible water quality for multiple water use within the Basin for both presently existing conditions and alternative patterns of Basin development in the future.
ENGINEERING STUDIES
Chief San Engr
Sanitary Engineer SA San E
Sanitary Engineer A San E
Sanitary Engineer A San E
Sanitary Engineer JA San E
Geologist GS-12
Geological Aide AMSO
Engineering Technician GS-5
Engineering Technician GS-5
Establishment of priorities for developing data on and securing needed remedial action in the most critical and pressing problem areas of pollution in the Basin. Planning, conducting, and reporting on field investigations to determine specific pollutants and their concentrations presently existing in the waters of the Basin. Developing analytical data as required for the Water Quality Management Program and Stream Flow Regulation Studies.
FLOW REGULATION STUDIES
Chief Sr San E
Sanitary Engineer SA San E
Engineering Aide GS-5
Responsible for implementing the provisions of Public Law 660, as amended, Section 2(b), within the Colorado River Basin. Conduct studies and prepare reports for all proposed Federal reservoirs with reference to a determination of stream flow for the purpose of water quality control.
BIOLOGY LABORATORY
Supervisory Biologist GS-13
Bacteriologist GS-11
Biologist GS-
Biologist GS-
Performs analyses in the area of aquatic biology on the waters and bottoms of the Colorado River and its tributaries and on the industrial, domestic, agricultural or other wastes which may enter these waters.
CLERK-STENOGRAPHER
GS-3
CLERK-STENOGRAPHER
GS-4
CLERK-STENOGRAPHER
GS-4

Colorado River Basin Water Quality Control Project

Roster of Personnel and Positions

Grade CS or CO	Title	BSS Job No.	Name	Annual Salary as of 1/1/63	Annual Salary as of 1/1/64
Project Direction					
SEDIR	Project Director		Charles E. Sponagle	$ 10,895.76	$ 10,895.76
SSE	Deputy Project Director		Joseph W. Fitzpatrick	10,624.56	10,624.56
GS-10	Administrative Officer	5609	Charles H. Petersen	8,270.00	8,710.00
GS-5	Secretary		Wilma L. Phillips	4,885.00	5,170.00
*GS-4	Clerk-Stenographer		Vacant	4,250.00	4,355.00
GS-3	Clerk-Typist		Mary G. Spedon	4,580.00	4,650.00
Water Quality Management Program					
SSE	Chief		Herbert R. Pahren	8,944.56	8,944.56
SASE	Sanitary Engineer		James W. Meek	7,354.56	7,594.56
JASE	Sanitary Engineer		James P. Heaney	4,563.36	4,563.36
GS-7	Engineering Technician		Roger C. Rivenes	5,540.00	5,795.00
GS-4	Clerk-Stenographer		Donna J. Pearson	4,810.00	4,915.00
Economic Studies					
GS-13	Project Economist	4178	Kenneth C. Nobe	11,515.00	12,110.00
GS-11	Economist	4736	George G. Collins	8,310.00	8,690.00
GS-4	Statistical Clerk		Alice M. Brown	4,250.00	4,355.00
Engineering Studies					
SE	Chief		E. J. Struzeski, Jr.	7,775.16	7,775.16
SASE	Sanitary Engineer		Lloyd A. Reed	7,415.16	7,655.16
ASE	Sanitary Engineer		Larry A. Esvelt	5,126.88	5,126.88
ASE	Sanitary Engineer		Herbert M. Dawson	5,126.88	5,126.88
JASE	Sanitary Engineer		Irwin B. Adler	4,264.56	4,301.56
AHSO	Health Services Officer		Edgar A. Pash	5,126.88	5,126.88

*Proposed additional position

Grade CS or CO	Title	BSS Job No.	Name	Annual Salary as of 1/1/63	Annual Salary as of 1/1/64
Engineering Studies (continued)					
GS-12	Geologist	5179	Sidney J. Spiegel	$ 9,790.00	$ 10,310.00
GS-5	Engineering Technician		Eugene R. Korolevich	4,725.00	4,850.00
GS-5	Engineering Technician		John M. Alvarez	4,250.00	4,690.00
GS-4	Clerk-Stenographer		Evelyn K. Sneddon	4,250.00	4,355.00
Flow Regulation Studies					
*SSE	Chief		Philip J. Coffey (EOD 3/1/63)	10,624.56	10,624.56
*SASE	Sanitary Engineer		Vacant	7,415.16	7,415.16
*GS-5	Engineering Technician		Vacant	4,565.00	4,690.00
Project Laboratory, Salt Lake City, Utah					
Laboratory Direction					
GS-15	Laboratory Director	3631	D. Edward Rushing	14,565.00	15,665.00
GS-7	Administrative Aide		Hallace N. Gullickson	5,910.00	6,185.00
GS-5	Secretary		Blanche Zeman	5,365.00	5,490.00
GS-3	Clerk-Stenographer		Vacant	4,110.00	4,215.00
GS-3	Clerk-Stenographer		Vacant	4,110.00	4,215.00
Biology Laboratory					
GS-13	Supervisory Biologist	4128	Croswell Henderson	12,610.00	13,265.00
GS-11	Bacteriologist (General)	4361	Robert H. Bordner	8,310.00	8,690.00
GS-7	Biologist	4949	Paul A. Fichter	5,910.00	6,185.00
GS-5	Biologist (Water Poll.)	5048	James L. Pedersen	4,345.00	4,690.00

*Proposed additional position

Grade CS or CO	Title	BSS Job No.	Name	Annual Salary as of 1/1/63	Annual Salary as of 1/1/64
Inorganic Chemistry Laboratory					
GS-13	Supervisory Chemist	4406	John G. Connor	$ 11,515.00	$ 12,110.00
GS-11	Chemist	4409	Raymond K. Jarrell	9,105.00	9,530.00
GS-7	Chemist	4693	Ronald J. Freking	6,650.00	6,965.00
GS-4	Physical Science Aide		Douglas C. Sawtelle	4,110.00	4,215.00
Organic Chemistry Laboratory					
GS-13	Supervisory Chemist	4408	Elmo C. Julian	12,245.00	12,880.00
GS-12	Chemist	5055	Theodore Woodward	9,475.00	9,980.00
GS-9	Chemist	4410	Hans Keisler	7,575.00	7,950.00
GS-4	Physical Science Aide		Vacant	4,110.00	4,215.00
Radiochemistry Laboratory					
HSO	Supervisory Chemist		Niilo A. Talvitie	9,875.16	9,875.16
GS-11	Chemist	4692	William J. Garcia	9,105.00	9,530.00
GS-11	Chemist	4692-IA	Robert J. Demint	9,105.00	9,530.00
GS-9	Chemist	4076	Don A. Clark	7,800.00	8,180.00
GS-4	Physical Science Aide		Carl E. Castline	4,110.00	4,215.00

Colorado River Basin Water Quality Control Project

Analysis of Vacancies

Title	Grade	Status of Position Description Written	Approved by Region	BSS No.	Persons Under Consideration Name	Rated	Notes
AUTHORIZED VACANCIES							
Project Laboratory							
Clerk Stenographer	GS-3	Yes	Yes	-		Yes	1
Physical Science Aide	GS-4	Yes	Yes	-	Richard J. Farmer	Yes	2
Clerk-Stenographer	GS-3	Yes	Yes	-		Yes	3
Project Headquarters - None							
UNAUTHORIZED VACANCIES							
Project Laboratory - None							
Project Headquarters							
Clerk-Stenographer	GS-4	No	No	-			4
Sanitary Engineer	SASE	No	No			C/O	5
Engineering Technician	GS-5	No	No	-			6
Sanitary Engineer	SSE	No	Yes	-	Philip J. Coffey	C/O	7

Notes:

1 Presently recruiting. Anticipate filling position March 18, 1963.
2 Applicant will report for duty February 28, 1963.
3 Plans call for filling this position late in FY 1964.
4 Position description in draft form. Will be submitted to Regional Office for classification in March. When filled incumbent will be assigned to Office of the Project Director and will serve as secretary to Deputy Project Director and assist other offices during peak periods.
5 Stream Flow Regulation Studies Unit. Status of funds determining factor for filling position.
6 Same as 5
7 Same as 5

Colorado River Basin Water Quality Control Project

Budget Analysis - FY 1963

		First Half FY 1963	Second Half FY 1963
INTERNAL (FY 1963 minus external expenses)	TOTAL	$218,598.00	$206,147.00
EXTERNAL			
Contracts for Investigations or Services			
U. S. Dept. of Agriculture		$ 9,550.00	$ 15,450.00
University of Utah		2,000.00	-0-
ARMU		65,050.00	-0-
U. S. Geological Survey		2,240.00	-0-
Sample Collection by Private Citizens		5,184.00	6,000.00
Reimbursements to Other Federal Agencies			
General Services Administration		7,081.00	6,500.00
Transfers to Other PHS Units			
R.A. Taft Sanitary Eng. Center		4,000.00	-0-
Federal Employee Health Unit		200.00	-0-
	TOTAL	$ 95,305.00	$ 27,950.00

Object Class.			
Personal Services and Benefits			
11	Personnel Compensation	$140,181.00	$148,600.00
12	Personnel Benefits	19,160.00	20,085.00
Contractual Services and Supplies			
21	Travel and Transportation of Persons	34,278.00	23,000.00
22	Transportation of Things	9,017.00	6,000.00
23	Rent, Communications, and Utility Serv.	3,057.00	2,400.00
24	Printing and Reproduction	1,138.00	1,500.00
25	Other Services	92,461.00	15,912.00
26	Supplies and Materials	13,146.00	5,000.00
Acquisition of Capital Assets			
31	Equipment	1,465.00	11,600.00
	TOTAL	$313,903.00	$234,097.00

Statement of Income

Enforcement Branch		$525,000.00
Reimbursements:		
Corps of Engineers		6,000.00
Bureau of Reclamation		17,000.00
	TOTAL	$548,000.00

Colorado River Basin Water Quality Control Project

Budget Analysis - FY 1963

Activity	First Half FY 1963	Second Half FY 1963	Total
Office of Project Director	$23,000	$22,000	$45,000
Water Quality Management Program	24,000	26,000	50,000
Engineering Studies	34,000	35,000	69,000
Economic Studies	103,000	9,000	112,000
Laboratory	121,000	130,000	251,000
Flow Regulation Studies	9,000	12,000	21,000
TOTAL	$314,000	$234,000	$548,000

A further partial breakdown of the above figues by activity. This does not add to total budget.

Stream Studies	$ 31,000	$ 28,000	$ 59,000
Inventories	3,000	1,000	4,000
Hydrologic Studies	1,000	2,000	3,000
Data Processing	3,000	5,000	8,000
Reports (Preparation and Printing)	13,000	27,000	40,000
Radiological	40,000	30,000	70,000
Conference and Meeting Preparation	5,000	12,000	17,000

Colorado River Basin Water Quality Control Project

Fiscal Year 1964 Apportionment

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	Total
Travel	$ 15,000	$ 13,170	$ 10,200	$ 14,000	$ 52,370
Equipment	4,020	2,000	2,000	1,000	9,020
Supplies	5,500	4,500	4,430	5,000	19,430
Contracts	120,000	4,000	2,700	-0-	126,700
Other	89,500	89,200	89,198	89,500	357,398
TOTAL	$234,020	$112,870	$108,528	$109,500	$564,918

Note: Quarterly apportionment as shown above does not include costs for Flow Regulation Studies.

Budget Analysis - FY 1964

(continued)

Object Class.		Office of Proj. Dir.	Water Quality Mgmnt.	Eng. Studies	Economic Studies	Project Lab.	Total	Flow Reg.	Total
	Personal Services and Benefits								
11	Personnel Compensation	$40,975	$25,678	$47,913	$12,765	$175,460	$302,791	$26,995	$329,786
12	Personnel Benefits	7,012	7,527	14,784	1,082	15,277	45,682	5,914	51,596
	Contractual Services and Supplies								
21	Travel and Transportation of Persons	4,800	3,800	17,120	1,200	12,000	38,920	7,400	46,320
22	Transportation of Things	600	100	10,000	-0-	2,750	13,450	1,000	14,450
23	Rent, Communications, and Utility Services	3,600				2,400	6,000	900	6,900
24	Printing and Reproduction	200	500	1,525	200	500	2,925	1,000	3,925
25	Other Services	-0-	5,000	17,700	100,000	4,000	126,700	2,500	129,200
26	Supplies and Materials	600	600	1,400	360	16,470	19,430	980	20,410
	Acquisition of Capital Assets								
31	Equipment	300	-0-	1,500	-0-	7,220	9,020	2,600	11,620
	TOTAL	$58,087	$ 43,205	$111,942	$115,607	$236,077	$564,918	$49,289	$614,207

Colorado River Basin Water Quality Control Project

Budget Analysis - FY 1964

	Office of Proj. Dir.	Water Quality Mgmnt.	Eng. Studies	Economic Studies	Project Lab.	Total	Flow Reg.	Total
INTERNAL (FY 1964 minus external expenses)	$57,287	$38,105	$86,242	$15,607	$229,977	$427,218	$45,789	$473,007
EXTERNAL								
Contracts for Investigations or Services								
U.S. Geological Survey			700			700		700
U.S. Dept. of Agriculture				20,000		20,000		20,000
University of Utah (data processing and bio. ident.)					3,000	3,000	2,000	5,000
ARMU				80,000		80,000		80,000
Sample Collection by Private Citizens			17,000			17,000		17,000
Laboratory Laundry Service and Gas Cylinder Rental					900	900		900
Laboratory Instrument Maintenance Contracts					1,000	1,000		1,000
Reimbursements to Other Federal Federal Agencies								
GSA - Vehicle Rental	600.	100	8,000		1,200	9,900	1,000	10,900
GSA - Office Renovation (Flow Regulation)							500	500
Transfers to Other PHS Units								
Federal Employee Health Unit	200					200		200
Radiological Health or SEC (Automatic Data Processing)		5,000				5,000		5,000
TOTAL	$ 800	$ 5,100	$ 25,700	$100,000	$6,100	$137,700	$ 3,500	$141,200

SPACE AND FACILITIES

Colorado River Basin Project Headquarters
Room 414, Building 22, Denver Federal Center
Denver 25, Colorado

Amount of space occupied:

General-Purpose Office Space	2,965 sq. ft.
Storage and Work Room	445 sq. ft.
Total	3,410 sq. ft.

Property is controlled by General Services Administration. All utilities, janitorial services, etc., furnished by GSA at no cost to the Project. On November 28, 1962, a formal request for an additional 600 square feet of space was forwarded through prescribed communication channels; to date, no answer has been received. The additional space would provide a combination conference room, reference library, and maproom facility.

Colorado River Basin Project Laboratory
Room 142, 1750 South Redwood Road
Salt Lake City, Utah

Amount of space occupied:

General-Purpose Office Space	1,370 sq. ft.
Laboratory	6,980 sq. ft.
Total	8,350 sq. ft.

Property controlled by General Services Administration. All operating and maintenance costs paid by GSA.

EQUIPMENT

Colorado River Basin Project Headquarters

None

Colorado River Basin Project Laboratory

1) Boat - used for collection of biological and water samples.

2) Mobile Laboratories
   a) Bacteriology - small truck, equipped with incubator, sterilizer, etc., for doing bacteriological work in field.
   b) Chemical - trailer laboratory, large enough to accommodate 2 or 3 chemists. To be used on inorganic field determinations and in the preliminary preparation (extraction) of samples on which organic contaminents (pesticides) are to be run in laboratory.

3) Pulse height analyzer, Frisch grid chamber, low-level beta counters, scintillation counters, proportional counters, fluorimeter. These are and will be used to determine radium, uranium, and other radionuclides (e.g., Pb-210, Zn-65, Sr-90) in waters, effluents, sediments, vegetables, bone, fish, etc.

4) Flame photometer - used routinely to determine potassium, sodium, strontium, and lithium in waters.

5) Autoratic titrator - used routinely to determine alkalinity, pH, chlorides in water.

6) Infrared spectrophotometer - used as an aid in the identification of organic contaminants of water.

7) Gas chromatograph - used to separate and to determine organic contaminants of water. Identification is not positive; hence the need for the infrared spectrophotometer.

8) Beckman DK-2 spectrophotometer - used particularly in the ultraviolet region to determine and identify certain organic contaminants of water.

Remarks:

No need for more space or major equipment during remainder of FY 1963 is anticipated. However, a considerable amount of minor equipment is needed. These items are listed below:

Item	Cost
Cell Holder for Infrared	$ 535.00
Melting Point Apparatus	115.00
Spectrophotometer	1,240.00
Automatic Intermediate Balance	660.00
Modification of Low-Level Beta Counter	650.00
Platinum Ware - repair and replacement	500.00
Calculator	1,050.00

Consultants and Technical Committees

1. Regulatory Agencies

Conference on Pollution of the Interstate Waters
of the Colorado River and Its Tributaries

The Colorado River Basin Water Quality Control Project was initiated by the Public Health Service at the request of the water pollution control agencies of the seven Basin States at a conference called by the Surgeon General in Phoenix, Arizona January 13, 1960, under the provisions of Section 8, Public Law 660, 84th Congress, the Federal Pollution Control Act. The Project is operating under the interstate enforcement provisions of the Act. Under the conference mechanism the official conferees consist of a representative of the Public Health Service and the water pollution control agencies of each of the states involved. This conference has held annual meetings in 1961 and 1962; a pre-conference meeting will be held in Santa Fe, New Mexico during February 13-15, 1963 to inform the conferees of Project progress and future plans. It is anticipated that similar pre-conference sessions will be held annually in the future. The conferees are:

Mr. Murray Stein, Chairman
Chief, Enforcement Branch
Division of Water Supply and Pollution Control
U. S. Public Health Service
Washington, D. C.

Mr. Lester M. Klashman
Regional Program Director
Division of Water Supply and Pollution Control
U. S. Public Health Service
Denver, Colorado

Mr. George W. Marx
Director, Division of Sanitary Engineering
State Department of Health
Phoenix, Arizona

Mr. Paul R. Bonderson, Executive Director
California State Water Pollution Control Board
Sacramento, California

Mr. William N. Gahr, Director
Division of Sanitation
Colorado State Department of Health
Denver, Colorado

1. Regulatory Agencies (continued)

Mr. Wallace W. White, Director
Bureau of Environmental Health
Nevada State Department of Health
Reno, Nevada

Mr. Charles G. Caldwell, Director
Environmental Sanitation Services
New Mexico Department of Public Health
Santa Fe, New Mexico

Mr. Lynn M. Thatcher, Executive Secretary
Utah Water Pollution Control Board
Salt Lake City, Utah

Mr. Arthur W. Williamson, Director
Division of Environmental Sanitation
Wyoming Department of Public Health
Cheyenne, Wyoming

2. Interest Groups Other Than Regulatory Agencies

Contact has been made with the following agencies through correspondence and personal visits. It is anticipated that these agencies will provide technical assistance to the Project in the future.

a. Office of the Southwestern River Basin Representative
Soil Conservation Service
U. S. Department of Agriculture

b. Resources For the Future, Inc.
1775 Massachusetts Avenue, N.W.
Washington 6, D. C.

c. Grand Junction Chamber of Commerce
Grand Junction, Colorado

d. Yuma Chamber of Commerce
Yuma, Arizona

e. Durango Chamber of Commerce
Durango, Colorado

f. Intermountain Forest and Range Experiment Station
U. S. Forest Service
25th and Adams Avenue
Ogden, Utah

3. Cooperating Groups

a. Federal Agencies

1. Western Basin Programs, River Basin and Watershed Branch Economic Research Service, U.S. Department of Agriculture, P.O. Box 290, College Station, Logan, Utah.

   This agency is providing continued assistance in the agricultural phases of an Economic Base Survey of the Colorado River Basin.

2. Geological Survey, U.S. Department of Interior

   Area offices at Denver and Grand Junction, Colorado; Salt Lake City, Utah; Yuma, Arizona; Santa Fe and Albuquerque, New Mexico are providing water quality, stream gaging and flow information on a continuing basis. Certain field equipment, including the outfitting of a mobile laboratory, have been fabricated for the Project by the USGS office in Denver.

3. Bureau of Reclamation, U.S. Department of Interior

   Area offices in Denver and Grand Junction, Colorado; Salt Lake City and Provo, Utah; Boulder City, Nevada; Phoenix, Arizona; Yuma, Arizona; and Rock Springs, Wyoming, have assisted the Project by providing water quality, irrigation use and stream flow information. The Yuma Projects Office of the Bureau of Reclamation also maintained one of the Yuma, Arizona area sampling stations.

4. Soil Conservation Service, U.S. Department of Agriculture

   Area offices in Price, Utah; Mountain View, Wyoming; Durango, and Denver, Colorado have assisted the project by providing data on irrigation water use, land ownership and allied data for various portions of the Colorado River Basin.

5. Forest Service, U.S. Department of Agriculture

   Area offices in Ft. Collins and Denver, Colorado; Ogden and Price, Utah have assisted the Project by providing data on forest acreages, timber sales and economic statistics for National Forest lands in the Colorado River Basin.

6. Bureau of Land Management, U.S. Department of Interior

   Area offices in Price, Utah and Rock Springs, Wyoming provided data on BLM acreages, livestock carrying capacity and the like for various study areas within the Colorado River Basin.

3. Cooperating Groups (continued)
   a. Federal Agencies (continued)

7. Bureau of Mines, U.S. Department of Interior

   The Denver area office provided trend data on mining statistics for counties in the Colorado River Basin.

8. Bureau of Census, U.S. Department of Commerce

   The Denver area office provided special assistance in obtaining various population, agriculture and other census reports for Colorado River Basin Counties.

9. Bureau of Labor Statistics, U.S. Department of Labor

   The Denver area office provided special labor force and employment statistics for Colorado counties in the Animas-LaPlata watersheds.

10. San Juan Basin Health Unit, Durango, Colorado

    This office is maintaining one of the Project's RMN sampling stations on the Animas River.

11. San Juan Physiological Research Project
    DRN, Public Health Service, Farmington, New Mexico

    This agency is maintaining four RMN sampling stations on the Animas and San Juan Rivers.

12. Communicable Diseas Center, U.S. Public Health Service, Greeley, Colorado

    This office provides evaluations of the vector control aspects on various construction agency projects for which Project reports are prepared.

13. International Boundary Commission

    This agency collects samples and provides flow data for the Colorado River at the northerly U.S.-Mexico boundary.

14. U.S. Atomic Energy Commission

    This agency worked with Project on the solution of the radiological pollution problems.

3. Cooperating Groups (Continued)

b. State Agencies

(1) Associated Rocky Mountain Universities, Inc.
Boulder, Colorado

Under a contractual agreement, this group is carrying out an Economic Base Survey of the Colorado River Basin. Four universities - University of Colorado, Colorado State University, University of Denver and University of New Mexico - are actually engaged in the study on a sub-contract basis.

(2) University of Utah, Salt Lake City, Utah

Personnel in the Bureau of Economic and Business Research at the University of Utah provided population projections and land use and ownership data for Carbon County, Utah for use in the preparation of a P oject report for the Price River Basin.

(3) University of Wyoming, Laramie, Wyoming

Personnel in Division of Business and Economic Research are assisting in the development of an input-output matrix for the Green River Sub-Basin.

(4) Departments of the State of Colorado

The Departments of Employment, Fish and Game, Natural Resources, Revenue, and Bureau of Mines provided unpublished data for use in a Project report on the Animas-La Plata watersheds. The State Engineer provided data on water rights and irrigated acreage.

(5) Department of Employment, State of Utah

This agency provided current employment and labor force information for Carbon County, Utah for use in a Project report on the Price River Basin.

(6) Office of the State Engineer, State of Utah

Provided technical review comments on the Project's report on the Price River Basin.

(7) County Health Departments of Arizona, Utah, Nevada, Colorado and New Mexico provided inventory data of water uses and waste discharges.

3. Cooperating Groups (Cont'd)

c. Formal Committees - ARMU/PHS Economic Advisory Committee

Dr. Nathaniel Wollman (Chairman)
University of New Mexico
Albuquerque, New Mexico

Dr. Robert V. Bartz (Ex officio)
Executive Director, ARMU
University of Colorado
Boulder, Colorado

Dr. Bernard Udis (Ex officio)
University of New Mexico
Albuquerque, New Mexico

Dr. Clyde E. Stewart
U. S. Department of Agriculture
Logan, Utah

Dr. Mark Cannon
Brigham Young University
Provo, Utah

Dr. Claron E. Nelson
Department of Economics
University of Utah
Salt Lake City, Utah

Dr. Clyde O. Martz
School of Law
University of Colorado
Boulder, Colorado

Dr. Bruce Mason
Bureau of Government Research
Arizona State University
Tempe, Arizona

Mr. John Welles
Denver Research Institute
University of Denver
Denver, Colorado

Dr. Charles Ramsey
Colorado State University
Fort Collins, Colorado

Dr. Morris E. Garnsey
Department of Economics
University of Colorado
Boulder, Colorado

Mr. Clark Crain
Department of Geography
University of Denver
Denver, Colorado

Dr. Jack Wagar
Dept. of Recreation and
Watershed Management
Colorado State University
Fort Collins, Colorado

d. Consultants

1. Dr. Allen V. Kneese
Water Resources Economist
Resources For The Future, Inc.

Provided by RFF at no charge for technical consultation on economic base survey activities in the Colorado River Basin.

2. Mr. Richard E. Lund
University of Wyoming
Laramie, Wyoming

Provides technical assistance in the development of an inter-industry input-output approach for use in the Economic Base Survey of the Colorado River Basin.

3. Mr. William McDaniel
University of New Mexico
Albuquerque, New Mexico

Provides technical assistance in the development of a Project salinity study of the Colorado River Basin and provides liaison with the RFF/New Mexico salinity study of the Colorado River Basin.

Activity: Crop Surveys

Purpose: Evaluation of radiological content of vegetables and crops grown on farms irrigated by water containing uranium mill wastes and comparison with crops and vegetables irrigated by uncontaminated waters.

Accomplishments:

1. FY 1963 to date. A fifth crop collection as part of the continuing program on radioactivity of vegetables and crops from selected farms within the Basin was carried out.

Data was obtained from the first four crop surveys and a report presenting the results is in the final stages of preparation.

2. Balance of FY 1963. No additional activity is planned. The crop report mentioned above is planned to be issued around March 1, 1963.

Plans for FY 1964:

Data from the fifth crop collection will be analyzed and compared to data gathered from the first four surveys.

Activity: Lake Mead Water Quality Study

Purpose: This study will have a four-fold purpose:

1. Determination of water quality of Lake Mead for public water supply

2. Assessment of pollutional effects of motorboats.

3. Determination of water quality effects of recreational campsites.

4. Determination of sources, quality, quantity, and character of industrial discharges entering Las Vegas Wash.

Accomplishments:

1. FY 1963 to date. USGS published water quality data has been collected and partially analyzed to determine its applicability. Other Federal and Stage agencies have been contacted for additional water quality data which is available. Some preliminary planning for a field survey of Lake Mead has been carried out.

2. Balance of FY 1963. Planning and conducting of a 1 to 2-week field study will be carried out prior to May 1963 to obtain this necessary chemical, radiological and bacteriological information.

Plans for FY 1964:

Evaluation, analysis and correlation of data obtained from the field survey and other sources will be carried out. Preparation of a report concerning this activity will be completed.

Activity: Determination of lead-210 in uranium mill effluents and environmental media.

Purpose: Conduct limited sampling of uranium mill effluents and environmental media to ascertain levels of lead-210 in view of its possible importance as a water contaminant and its low maximum permissible concentration.

Accomplishments:

1. FY 1963 to date. Uranium mill effluents and sediments were taken in the vicinity of a number of uranium mills. Nine effluent samples were taken from five uranium mills (VCA at Durango, Colorado; UCN at Uravan, Colorado; UCN at Maybell, Colorado; UCN at Rifle, Colorado; Texas-Zinc at Mexican Hat, Utah). These are being analyzed at the present for lead-210. (Radium determinations on the same samples have been completed.) Preliminary results on four effluent samples from two mills seem to show that lead-210 concentrations vary greatly with the mills and range from 4 to 20 times the radium concentrations.

2. Balance of FY 1963. Analyses for lead-210 will be completed in time for a presentation of results in April 1963. No additional work is planned in this fiscal year.

Plans for FY-1964:

If the results of the analyses indicate further work is needed, the investigations would be extended to include the pollutional effects of lead-210 on water and crops.

Activity: Radium Uptake by Stream Biota

Purpose: To determine the concentration of radium and possibly other nuclides in various kinds of stream biota including fish, bottom animals, and algae.

Accomplishments:

1. FY 1963 to date. This study has just recently been initiated. Approximately 20 fish samples have been collected from the upper Green River for analysis of Ra-226. Approximately 70 bottom animal samples from the upper and lower Colorado River and several tributaries are also available for analysis. No samples have been analyzed to date due to the laboratory backlog of other samples.

2. Balance of Fiscal Year 1963. Arrangements have been made with the Utah Fish and Game Department to collect fish in the Colorado River and tributaries in Utah during the spring and early summer of 1963. Fish will also be collected from Lake Mead during this period.

Plans for FY 1964:

It is expected that fish and other aquatic biota collections will be made in the upper Colorado and tributaries in Colorado during fiscal year 1964. Samples will be analyzed for radium and other nuclides as the laboratory work load permits.

Activity: Yuma, Arizona Vicinity Salinity Problem Study

Purpose: This activity was initiated following a short-term field study, to provide additional needed water quality data to fully assess the sudden chemical water quality degradation of the water supply for the City of Yuma, Arizona obtained from the Colorado River.

Accomplishments:

1. FY 1963 to date. After termination of the sampling network, with the exception of the northerly U. S.-Mexico Border station, and receipt of the final laboratory data, preparation of a complete report of the situation has progressed. The draft of the report is now in the advance stage of preparation.

2. Balance of FY 1963. The final report of water quality in the Yuma, Arizona vicinity will be completed by April 1963.

Liaison will be maintained with the Bureau of Reclamation Region III concerning their study of the Wellton-Mohawk Division.

Plans for FY 1964:

Surveillance sampling for both chemical and radiological analyses will continue at the northerly U.S.-Mexico border to provide the Project with current data on the water quality of the Colorado River at this point.

Activity: Dike Construction Criteria

Purpose: Development, in conjunction with the Atomic Energy Commission, of standards for construction of waste holding lagoons and dikes at uranium mills.

Accomplishments:

1. FY 1963 to date. Design and construction criteria for waste lagoons was worked out jointly with the AEC. Detailed information on design and construction will be required of the mills by the AEC as part of licensing of the mills.

A final draft was prepared in November 1962 and will shortly be distributed by AEC to the States and uranium mills for review.

2. Balance of FY 1963. The dike construction criteria will become a part of the AEC licensing requirements.

Plans for FY 1964:

No activities planned.

Activity: Uranium Mill Spill-alerting System

Purpose: This system provides prompt notification of down-stream water users in the event of accidental release of radioactive and chemically toxic uranium milling wastes.

Accomplishments:

1. FY 1963 to date. The following method of notification of all parties concerned has been established:

a. The uranium mill involved immediately notifies the Atomic Energy Commission, Division of Compliance, Denver.

b. The AEC then notifies the state health department of the state where the spill occurred. If there is a separate water pollution control agency, this agency would be notified. The down-stream state officials would also be notified.

c. The AEC also notifies the Colorado River Basin Project.

d. The state water pollution control agencies then notify downstream communities and water users, local health agencies, the Governor, and other state governmental units as necessary.

e. The Project and the AEC notify respectively the Sanitary Engineering Center and AEC headquarters.

f. The Project also notifies the Regional Program Director, Water Supply and Pollution Control, Region VIII, Denver, who reports to the Public Health Service Regional Health Director, Region VIII, who notifies the Regional Director, DHEW, Region VIII, who then informs DHEW, Washington, D. C.

2. Balance of FY 1963. This alerting procedure will be ready to function at all times when necessary.

Plans for FY 1964:

The alerting system will remain in effect.

Activity: Monticello Surveys

Purpose: To evaluate the pollutional effects of residual contamination from the Atomic Energy Commission uranium mill at Monticello, Utah. This mill has been shut down since 1959.

Accomplishments:

1. FY 1963 to date. A fourth survey of South and Montezuma Creeks in the vicinity of the mill was carried out in October 1962.

2. Balance of FY 1963. A brief survey will again be carried out during the latter part of FY 63.

The data obtained from all the surveys will be analyzed and if possible presented in a report by the end of FY 63.

Plans for FY 1964:

No additional activity is planned in this area during FY 64.

Activity: Uravan Surveys

Purpose: To assess the chemical, biological, and radiological pollutional effects of discharge of wastes primarily from the Union Carbide Nuclear Company uranium mill at Uravan and the Vanadium Corporation of America upgrading plant at Naturita.

Accomplishments:

1. FY 1963 to date. Sampling was carried out on the San Miguel-Dolores Rivers in the Uravan-Gateway area during August 1962.

2. Balance of FY 1963. A brief survey will be conducted in the area during the latter part of FY 63. This will be carried out following installation of new waste ponds at the Uravan mill. The data obtained will be analyzed and if possible presented in a report by the end of FY 63.

Plans for FY 1964:

Additional brief sampling for surveillance purposes will continue in this area during FY 64.

Activity: Dolores-San Miguel Rivers Water Quality Study

Purpose: The objectives of this survey were to obtain detailed information on chemical and radiological water quality of the river system and to differentiate between natural and man-made sources affecting water quality.

Accomplishments:

1. FY 1963 to date. Data analysis and evaluation has now begun.

2. Balance of FY 1963. Evaluation of information obtained during the survey will continue.

Plans for FY 1964: Data analysis will be completed and a report covering the Project's activities in this area will be written in FY 1964.

Activity: Follow-up Bottom Animal Study, Dolores-San Miguel Rivers

Purpose: To further evaluate biological conditions in the San Miguel and Dolores Rivers below the uranium mill at Uravan, Colorado.

Accomplishments:

1. FY 1963 to date. An additional bottom animal survey as part of a continuing study since August 1960 was made during low water, high temperature conditions in August 1962. Other results for this program activity were reported at the Third Conference in the Matter of Pollution of the Interstate Waters of the Colorado River and Its Tributaries in May 1962. Bottom animal populations continue to be drastically curtailed by effluents from the Uravan mill.

2. Balance of FY 1963. At the present time, waste disposal ponds are being developed at the Uravan plant. Follow-up studies to evaluate anticipated improvements in the stream resulting from these treatment measures will be made in the spring of 1963.

Plans for FY 1964:

No bottom animal studies are actively scheduled for the Dolores-San Miguel Rivers during FY 1964.

Activity: Evaluation of the chemical toxicity of uranium mill and other industrial wastes to aquatic life.

Purpose: To obtain additional information on effluents previously found toxic to fish. Previous data on this subject was reported at the Third Conference on the Matter of Pollution of Interstate Waters of the Colorado and Its Tributaries in May of 1962. To evaluate the toxicity of newly discovered effluents in order to assess their possible effects on aquatic life in receiving streams.

Accomplishments:

1. FY 1963 to date. Laboratory bioassays were conducted on effluents from six uranium mills, two metal processing mills, and a gilsonite refinery. Some of these effluents were highly toxic to fish and are damaging aquatic life in receiving waters.

2. Balance of FY 1963. Bioassays will be repeated on some of the more toxic effluents to note any improvements or changes which may occur. Additional information such as their toxicity to different species of fish and the effect of certain water quality characteristics on toxicity will be evaluated in order to more completely assess the possible effects on aquatic life. As new effluents are discovered, bioassays will be conducted to determine their toxicity.

Plans for FY 1964:

The above program will be continued throughout FY 1964.

Activity: Radium Monitoring Network

Purpose: Routine surveillance of Basin waters for dissolved Radium-226. Such a network provides a continuous check on pollution of Basin waters due to extensive uranium mining and milling in the Basin.

Accomplishments:

1. FY 1963 to date. The network has continued in operation with 23 sampling stations in operation during the first half of FY 1963.

Radium-226 analyses from these stations have been reported in two data releases dated October 1962 and January 1963.

2. Balance of FY 1963. Samples collected from four RMN stations are presently being analyzed for chemical content in addition to radioactivity. The network will continue to operate with sample analyses being performed by the Project Laboratory. A third data release is planned in the fourth quarter.

Three new sampling stations are planned for the Lower Basin which will bring the network total to 26 stations.

Plans for FY 1964:

Data releases are planned on a more or less quarterly basis during FY 64 insofar as this is possible.

Current data will be carefully examined during the fiscal year with a view toward modification of location and number of network stations. Where data and other considerations warrant, certain stations may be discontinued or others added.

The feasibility of using additional RMN stations for monitoring of chemical quality will be investigated.

Activity: Basinwide Sediment Surveys

Purpose: The purposes of the Basinwide sediment surveys have been mainly (1) to determine the distribution of radioactivity in bottom sediments throughout the Basin, (2) to determine the natural background concentration of Radium-226 in Basin sediments, and (3) to assess the effects of uranium mill waste discharges upon the radioactivity of Basin sediments.

Accomplishments:

1. FY 1963 to date: A fourth Basinwide survey was carried out during September and October. The three previous surveys were carried out in August 1960, March 1961, and August 1961.

A report covering data gathered during the first three surveys is in final preparation and will be issued around February, 1963.

2. Balance of FY 1963. No additional activity is planned.

Plans for FY 1964:

The data from the fourth survey will be analyzed and a brief report prepared.

There are at present 88 locations throughout the Basin from which sediments are collected. The data from the four surveys will be carefully examined and the number of sampling stations reduced to around twenty to thirty.

A yearly collection (possibly in March, 1964, before onset of high flows) of sediment from these twenty to thirty stations is planned.

Activity: Water Quality Management Program Development

Purpose: A determination of methods for securing the best possible water quality for multiple water use and the development of a program of water quality control for multiple water use within the Basin which can serve as a guide for the conference in progress and other enforcement actions which may be instituted subsequently, and to State and Federal agencies having an interest in the prevention and control of water quality degradation.

Summary Statement:

The development of the water quality management program for the Colorado River Basin will consist of several major steps. These are as follows:

1. An economic base study of the Basin.

2. Inventory of basic data on water quality, water uses, and waste discharges.

3. Study of Basin hydrology.

4. Projection of future water uses and waste discharges for alternative growth paths.

5. Development of a water quality management program to achieve optimum water use to gain maximum benefits, along with recommendations for implementing the program.

Details on the activities comprising the water quality management program, along with a statement of progress, will follow this summary on the overall program.

The water quality management program has been with the Colorado River Basin Water Quality Control Project since its inception. When the first session of the conference was held in Phoenix, Arizona on January 13, 1960, three of the State Conferees specifically requested that the Public Health Service undertake a study of potential pollution in the Basin. It was stressed that a preventative approach should be taken in the Colorado River Basin rather than taking corrective action after pollution exists.

As a result of this request the Public Health Service agreed to undertake the development of a water pollution control program for the Basin. The summary of the first session of the conference, dated June 30, 1960, stated the objective as mentioned above.

An outline of tentative plans for the water quality management program, dated June 8, 1960, was given to the conferees. This outline summarized the principal elements to be considered in developing the program. The work for each of the elements is already in progress or is planned for the near future.

One of the first steps of the study is to inventory the basin. This involves collection of all data on population, industry, resources, water uses, quality and quantity of existing water supplies, and sources of pollution.

Using the past trend data, and based on a study of the resources of the region, the location advantages, existing facilities and job opportunities, a projection of the general pattern of the economy of the area can be made. These projections would include population, industry, agriculture, recreation, fishing, and other major water-using and pollution contributing elements of society. The projections developed in the economic base study can then be translated into future water demands and pollution loads.

Quantity and quality of water are both necessary in the consideration of water supplies. Quantity requires a special study of river flow characteristics. The ground water situation is also studied. All available data on water quality are collected, and where gaps of knowledge exist, water samples are collected. Water quality data are then related to the existing water uses and to the geology of the area. In conjunction with the States, water quality objectives at certain critical points of the streams are determined.

After all of the elements of the program are available, they must be related.

On appropriate basin and sub-basin maps, the relative locations of present and probable future water needs, both quality and quantity, sources of water supply with quality and quantity, and sources of population are shown. With this background of information, and a knowledge of water quality objectives, the study can then be made to show how water supply can best be developed for the various needs and locations as indicated by alternative growth paths for economic development. The location of pollution sources and degree of treatment required would also be determined. The need for flow regulation for water quality control to provide water of suitable quality so as to permit re-use would be studied too.

Considering the alternative growth paths of the Basin economy, with the most effective combination of waste treatment requirements and flow regulation after treatment to protect and enhance water quality, a water quality management program will be developed consisting of several alternative plans to achieve the optimum use and re-use of the water so as to gain maximum public benefits from the water resources. Recommendations for implementing the program would also be included.

Activity: Technical ecoromic assistance to the Water Quality Management Program group.

Purpose: To develop conclusions regarding the impact of present and future economic development on the quality of waters in the Colorado River system; to assist in the development of methodology for formulating a water quality management program for the Colorado River Basin consisting of a series of alternative water quality management plans; and to provide policy recommendations, based on the economic specialty viewpoint, concerning the scope and magnitude of project activities.

Accomplishments:

FY 1963 to date:

1. Developed a work proposal which resulted in a contract agreement with Associated Rocky Mountain Universities, Inc., (ARMU) for preparation of an economic base study of the Green River Sub-Basin and initiation of a similar study of the Upper Main-Stem Sub-Basin; continued supervision of their activities under this contract has been maintained.

2. Developed a work proposal which led to a reimbursement agreement with the Economic Research Service, U. S. Department of Agriculture for their participation in economic base studies of the Green River and Upper Main-Stem Sub-Basins; continued supervision of their activities under this agreement has been maintained.

3. Carried on a continuing program of basic data tabulation (consisting primarily of a summary of historical economic trend data for 54 Colorado River Basin counties) as reported in Bureau of Census publications and other applicable sources.

4. Developed methodology for utilizing economic projections in formulating a series of alternative water quality management plans for the Colorado River Basin. A technique known as the inter-industry input-output method was tested in an economic base study of a pilot area. The results of this effort are summarized in the following report: A Preliminary Economic Base Study of the Animas-La Plata Pilot Project Watersheds in the Four Corners Area of the Colorado River Basin, ER-1, July 1962.

5. Participated in a reconnaissance study of the Price River watershed area in Utah including supervision of the preparation of economic projections by personnel at the University of

Activity: Technical economic assistance to the Water Quality Management Program group (continued)

Utah; prepared the economic sections of the following Project report: Preliminary Report on Water Quality and Use Aspects of the Price River basin in East Central Utah, November 1962.

6. Provided editorial review, from the economic specialty viewpoint, for a number of Project reports.

7. Prepared material related to economic activities of the Project for the annual meetings with the State conferees of the Colorado River Basin enforcement action.

Balance of FY 1963:

1. Prepare a work program for ARMU and U. S. Department of Agriculture participation in economic base study activities in the Upper Main-Stem, San Juan, and Little Colorado Sub-Basins during FY 64.

2. Participate in the preparation of a final water quality management report for the Animas-La Plata pilot study watersheds.

3. Participate in the preparation of a final Project report on the Price River study.

4. Publish a Project report on land ownership status, by counties, for the Colorado River Basin.

5. Maintain an up-to-date picture of economic development in the Colorado River Basin through assimilation and evaluation of forthcoming Bureau of Census reports, other agency studies, newspaper accounts, and the like.

6. Provide editorial review comments, as required, on Project reports.

7. Participate in the annual Program Review meeting in Washington, D.C. and in the meeting with the State conferees of the Colorado River Basin enforcement action in Santa Fe, New Mexico.

Plans for FY 1964:

1. Supervise contractual agreements covering the participation of economic specialists from ARMU and the Economic Research Service, U. S. Department of Agriculture in the overall economic base study of the Colorado River Basin.

Activity: Technical economic assistance to the Water Quality Management Program group (continued)

2. Prepare a work program for ARMU and U. S. Department of Agriculture participation in economic base study activities in FY 1965.

3. Participate in the preparation of water quality management program reports for the Green River and Upper Main-Stem Sub-Basins.

4. Maintain an up-to-date picture of economic development in the Colorado River Basin through assimilation and evaluation of new Bureau of Census reports, other agency studies, newspaper accounts, and the like.

5. Provide editorial review comments, from an economic specialty viewpoint, for Project reports as required.

6. Provide material related to economic activities of the Project for a series of annual meetings; participate in a number of these meetings including the annual Program Review in Washington, D. C. and meetings with the conferees of the Colorado River Basin enforcement action.

Activity: Reimbursement Agreements with the Economic Research Service, U. S. Department of Agriculture.

Purpose: To analyze economic trend data relating to the agricultural industry in the Colorado River Basin (by its six major sub-basins) and its use of water for irrigation and other on-farm purposes; develop agricultural projections by sub-basins, in a form suitable for incorporation in the inter-industry input-output analysis under development under separate contract by universities of the Colorado Basin States; analyze the economic implications of changing the supply of water for agricultural use, and otherwise contribute to the overall economic analysis of water use in the Colorado River Basin.

Accomplishments:

FY 1963 to date:

1. Preparation of an Interim Report entitled: Investigations Relating to Agricultural Uses and Values of Water in the Colorado River Basin, Interim Report, FY 62, July 1962

2. Preparation of quarterly reports entitled: Investigations Relating to the Agricultural Uses and Values of Waters in the Colorado River Basin, Quarterly Report, July-September, 1962; October-December, 1962.

3. Completed analysis of pertinent national and regional agricultural projections.

4. Compiled a partial inventory of available material relating to the agricultural industry in the study area.

5. Completed data on punch cards for 577 farm records in the Green River Sub-Basin--including irrigation diversions.

6. Completed a summary of Census of Agriculture data for 12 representative counties in the Green River Sub-Basin.

7. Completed allocation of projections of U. S. total production needs for 1980 and 2000 proportional to the seven Basin states.

8. Prepared summary tables by agricultural commodities for 5 census years, seven Basin states and 76 Basin counties.

9. A list of county agents (Extension Service, U. S. Dept. of Agriculture), was compiled for all counties in the Colorado River Basin.

Activity: Reimbursement Agreements with the Economic Research Service, U. S. Department of Agriculture (Continued)

10. Began preparation of maps showing present irrigated areas in the Colorado River Basin.

Balance of FY 1963:

1. Completion of an agricultural report for the Green River ub-Basin.

2. Continuation of work on an agricultural report for the Upper Main-Stem Sub-Basin.

3. Completion of irrigated area maps for the Colorado River Basin.

Note: For additional detail on accomplishments and plans for balance of FY 1963, refer to the ERS-USDA progress report attached.

Plans for FY 1964:

1. Completion of an agricultural report for each of the following sub-basins: Upper Main-Stem, San Juan, and Little Colorado.

2. Initiation of agricultural studies in the Gila and Lower Main-Stem Sub-Basins.

Plans for FY 1965:

1. Completion of agricultural reports for the Gila and Lower Main-Stem Sub-Basins.

2. Completion of an overall agricultural report for the Colorado River Basin.

INVESTIGATIONS RELATING TO AGRICULTURAL USES AND VALUES OF WATER IN THE COLORADO RIVER BASIN

Quarterly Report

October - December

1962

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Plans

January - June

1963

Prepared by
Clyde E. Stewart
Agricultural Economist
Economic Research Service
U.S. Department of Agriculture
Logan, Utah

January 1963
Stewart

QUARTERLY REPORT

INVESTIGATIONS RELATING TO AGRICULTURAL USES AND VALUES OF WATER IN THE COLORADO RIVER BASIN

Personnel

Mr. Lynn Wilkes, ERS Salt Lake Office, is now working full time on this study. Stewart and one other economist will be available to spend part of the next six months on the study. Dave Nelson, Student Assistant, Logan, Utah, is available for clerical work on a part-time basis.

Progress, Second Quarter, Fiscal 1963

Four interrelated agricultural aspects are provided in the agreement. Accomplishments will be discussed under one heading of the four, although some items are relevant elsewhere, for the Green Subbasin. Additional background and detail are given in the report for the first quarter.

1. Agricultural characteristics 1960 and historical development

a. A base map for the Green Subbasin, scale 1/500,000 has been developed. On this map, present and potential irrigated areas will be delineated as a basis for locating specific areas, and describing their magnitude, history of development, kind of irrigation project, land use, the present economy, and potential development.

Data have been obtained for presently irrigated areas in Utah and arrangements completed for getting similar data for Colorado and Wyoming.

b. Index charts and trend lines are now being prepared showing for the 12 representative counties by states, Green Subbasin, and Colorado River Basin, the basic data on the agricultural economy that is tabulated in the 35 tables completed last quarter.

c. Three tables showing historical crop and livestock production and income data, Green Subbasin, 1939 to 1959, were prepared and distributed. These tables are:

(1) Acreage and quantity of crops harvested, all land
(2) Acreage and quantity of crops harvested, irrigated land
(3) Livestock and livestock products

Similar data have been summarized by machine use for all 6 subbasins, for the Colorado River Basin, and for the 7 states partly in the Colorado River Basin.

d. Use of Public Range Lands

Detailed historical use data and carrying capacities were compiled of lands administered by BLM in 7 districts in the Utah portion of the Colorado River Basin.

e. Forestry

Denver University will make available data obtained on forestry in Colorado. In turn, we will obtain data from the Ogden office of the Forest Service.

Utah State University earlier requested information from the Forest Service for lands in Utah concerning grazing use, picnic areas, timber cut, and big game. These data will be made available to us by the University.

f. Other Income and Production Data

Compilation and analysis were carried further on several other significant characteristics of the agricultural economy for counties and portions of states in the Subbasin including: types of farms, value of products sold, acres irrigated by drainage basin origin, cost of water to farms, production rates, and cropping pattern (including specific crops), taxes on real estate by states (1930-1961) with comparisons to others, agricultural prices, and farm employment, incomes and indebtedness for the three states.

These data are in tables that will be typed for distribution.

g. Detailed farm schedules

Data on about 400 detailed farm survey schedules are available for our use from another investigation in the Upper Colorado River Basin. These records include information on investment, production, land use, family characteristics, home conveniences and costs, markets, farm prices, inputs output, water use, water and land market values, etc.

In the Green Subbasin, records are for:

	Number
Lyman	75
Baggs-Dixon	20
Eden-Farson	32
LaBarge	17
Emery	112
Ashley Valley	60
Vernal	42
Duchesne	44
	402

Duchesne and Emery data are all on IBM cards and standard summaries have been completed. Data on other records are partly coded. These materials and records are now in our Logan office.

h. List of County Agricultural Agents

At the request of the Committee, a list of names of agents in all Colorado Basin counties in the three upper states was compiled, reproduced, and distributed to Committee members.

i. State Reports

Collection was made of Colorado, Utah, and Wyoming state reports to the extent available on recent annual agricultural statistics, ASC annual reports, and the State Conservation Needs reports. These reports will serve as a source for selected needed data.

2. Possibilities for future development

During the second quarter, USDA completed two reports on the Lyman Reclamation Project (1) size of income analysis and (2) appraisal of direct agricultural benefits. These reports and data are available as additions to the earlier noted reports in the Green Subbasin on Seedskadee, Vernal Unit, and Emery Projects. Apparently evident trans-mountain diversions, especially the Central Utah Project, will need consideration also.

3. National and regional projections - 1965, 1980, and 2010

Work has continued in Washington D.C. on the establishment of normalized values as a basis for projecting agricultural production needs in the Colorado River Basin. This analysis is part of a national ERS project to allocate national needs to regions and river basins.

Tentative projected national needs for food have been made for 1980 and 2000. As a first approximation, these needs have been allocated to the 7 Basin States on the basis of present and past production. In turn, we have estimated the portion of the 7 state production that is produced in the Colorado River Basin (76 and 54 county bases), and the Green Subbasin. This summary has been made for each census year, 1939 to 1959.

The work under "agricultural characteristics" and "possible future developments" serves also as a basis for projections from the 1960 base.

4. Projection of most probable growth path

Nothing has been done as yet specifically on this item although the work to date is all basic to this summary section.

PLANS - REMAINDER OF FISCAL 1963

1. Agricultural characteristics 1960 and historical development

a. The irrigated base map will be completed as soon as feasible and reproduced for distribution to Committee Members.

b. Charts will be distributed shortly showing trend lines of basic agricultural characteristics by States (representative counties in Subbasin), Green Subbasin, and Colorado River Basin. These lines will show direction of change as well as relative position with other areas.

c. Use of Public Range Land

Use and capacity of BLM lands in Green Subbasin (Colorado and Wyoming) and for all Forest Service lands in this Subbasin will be compiled and analyzed.

d. Forestry

This segment of the agriculture industry will be completed for Green Subbasin.

e. Land Tenure

These data will be completed for the 12 representative counties. This work was initiated earlier in the year by Denver PHS.

f. Detailed Farm Schedules

Data described in the Progress Report above on 402 farm schedules will be further coded, punched on cards, and analyzed. This material will serve as an important source of various coefficients for the input-output analysis and for distributing total agricultural incomes in the transactions tables.

g. Inter-Industry Input-Output Model, Green Subbasin, 1960

Estimates for the agricultural segment of this transactions table will be made by about April 1, 1963 for the Green Subbasin and for each representative county. These tables with supporting data will be submitted to the Committee Chairman at that time.

2. Possibilities for future development

Further inventory will be made of land and water projects underway. Prospective projects will also be inventoried and described, especially those proposed by the Bureau of Reclamation. These projects will be described in terms of effects by 1965, 1980, and 2010, as well as quantities of water involved.

3. National and regional projections - 1965, 1980, and 2010

The project at the Washington level will be continued. In the field, tentative projections of national needs will be allocated to the Colorado River Basin and Green Subbasin as a first approximation of a production framework within which development of water and land will be made.

The projections and budgeting work done by USDA on the benefit appraisal task noted earlier will be analyzed further to estimate the aggregate and marginal effects of additional water use. These projects are authorized and mostly under construction so they represent actual development of water for the future. These analyses will be valuable also in estimating effects of potential land and water development.

4. Projection of most probable growth path

An estimate will be made for this path on the basis of a 50-year period and base year 1960. This analysis will discuss possible variations, the outlook for agricultural production needs as related to the resources, and competitive aspects of water use.

Report of Findings

A draft report for the Green Subbasin will be completed by June 15, 1962 for submittal in 50 copies to the Public Health Service.

Activity: Contract agreements with Associated Rocky Mountain Universities, Inc.

Purpose: To provide economic base surveys for each of the six sub-basins of the Colorado River Basin which in turn will serve as basic elements in the development of alternative water quality management plans for the Colorado River system. The inter-industry input-output method shall be employed in the evaluation of the present and future economy (to the year 2010) in separate reports for each of the six sub-basins and for a final, overall Basin report. These reports will include data for the agricultural segment of the economy which in turn will be provided by the Public Health Service through a reimbursement agreement with the Economic Research Service, U. S. Department of Agriculture.

Accomplishments:

FY 1963 to date:

1. Associated Rocky Mountain Universities, Inc. negotiated subcontracts with the University of Colorado, Colorado State University, University of Denver, and the University of New Mexico for selected phases of the economic base surveys of the Green River and Upper Main-Stem Sub-Basins.

2. Preliminary population and labor force projections to the year 2010 were completed for each of the counties in the Green River Sub-Basin; work on projections for the remaining Colorado River Basin counties is underway.

3. A series of brief reports, entitled: "Demographic Characteristics of_____County" were prepared for each of the counties in the Green River Sub-Basin; preparation of reports for the remaining counties in the Colorado River Basin is underway.

4. Field interviews of selected manufacturing and mining establishments in the Green River Sub-Basin have been essentially completed.

5. Narrative reports covering historical development in the Green River Sub-Basin, by major industries, have been completed in draft form.

Balance of FY 1963:

1. Preliminary population and labor force projections for all Colorado River Basin counties are scheduled for completion.

Activity: Contract agreements with Associated Rocky Mountain Universities, Inc. (continued)

2. Development and publication of demographic reports on all Colorado River Basin counties.

3. Preparation of final population and labor force projections for all Green River Sub-Basin counties.

4. Completion of the first draft of the economic base survey report for the Green River Sub-Basin.

5. Initiation of field work in the Upper Main-Stem Sub-Basin.

Note: For additional detail on accomplishments and plans for balance of FY 1963, refer to the ARMU Progress Report attached

Plans for FY 1964:

1. Publication of the economic base survey reports for the Green River Sub-Basin and the Upper Main-Stem Sub-Basin.

2. Preparation of final population and labor force projections for the Upper Main-Stem, San Juan, and Little Colorado Sub-Basins.

3. Completion of the first draft of the economic base survey report for the San Juan Sub-Basin.

4. Initiation of the economic study of the Little Colorado Sub-Basin.

Plans for FY 1965:

1. Preparation of final population and labor force projections for the Gila and Lower Main-Stem Sub-Basins.

2. Publication of economic base survey reports for the San Juan, Little Colorado and Gila Sub-Basins.

3. Completion of the first draft of the economic base survey report for the Lower Main-Stem Sub-Basin.

4. Initiation of work on the final overall economic base survey report for the Colorado River Basin.

COPY

MEMORANDUM

January 16, 1963

To: Charles E. Sponagle, Project Director
Colorado River Basin Project
U. S. Public Health Service

From: B. Udis, Assoc. Professor of Economics
University of New Mexico
Associate Director AZMU-PHS Economic Study

Subject: I. Progress to date on the Economic Study of the Green and Upper Main Stem Sub-basins of the Colorado River.
II. Expected accomplishments during remaining period of fiscal year.

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I. Progress to date on the Economic Study of the Green and Upper Main Stem Sub-basins of the Colorado River.

A. The literature on regional economic analysis was surveyed intensively while searching for an appropriate analytical device to meet the expressed needs of PHS. I personally conferred with experts in the area of regional analysis in Pittsburgh to the same end.

B. An input-output model was prepared which would highlight heavy water using industries while revealing the structural interrelationships of the economy under examination.

C. Demographic analyses have been prepared to provide background data on population and labor force characteristics of each "representative" county in the Green.

D. Summary narrative analyses have been prepared for each of the Colorado and Wyoming counties in the Green. Statistical reports covering the Utah counties have also been completed.

E. Employment data has been gathered by industry for each county in the Colorado Basin.

F. Personal income statistics have been prepared for each county in the Green.

G. Historical data has been collected and analyzed covering the sales of retailers, wholesalers and service establishments for each county in the Colorado. (See attached memo dated 23 November 1962 for details.) Efforts are now underway to

omitted

get the Bureau of Census to provide data bearing directly on recreation in greater detail than is available in published sources.

H. Such institutions as local Chambers of Commerce and banks have been contacted in an effort to gain local support for and cooperation with our field workers.

I. Questionnaires have been prepared, field tested, and are now being used in direct interviews with business establishments (in manufacturing, mining, other energy producers, retail and wholesale trade, service, finance and lodging) located in the Colorado and Utah counties of the Green. Limitation of funds is restricting field work in the Wyoming counties of the Green with the result that greater reliance is being placed on published materials.

J. Questionnaires have been prepared and distributed to officials of the 12 Green sub-basin counties and to state officials in all seven Colorado River Basin states to obtain data on their economic activities.

K. Efforts are now underway to obtain totals and inter-industry flow data from the Federal government and the transportation, communication and construction industries.

L. A questionnaire is now being prepared for use in a mail survey of households in the Green area counties.

M. Substantial data collection has been accomplished for the recreation sector per se - see attached memo of 16 January 1963.

N. Details of work at individual schools - see attached memoranda addressed to Professor Wollman.

II. Expected accomplishments during remaining period of fiscal year 1963. (Please note that contract No. PH 86-63-10 with ARMU calls for completion by 14 August 1963. Consequently items appearing below may not, in fact, be available by 30 June 1963.)

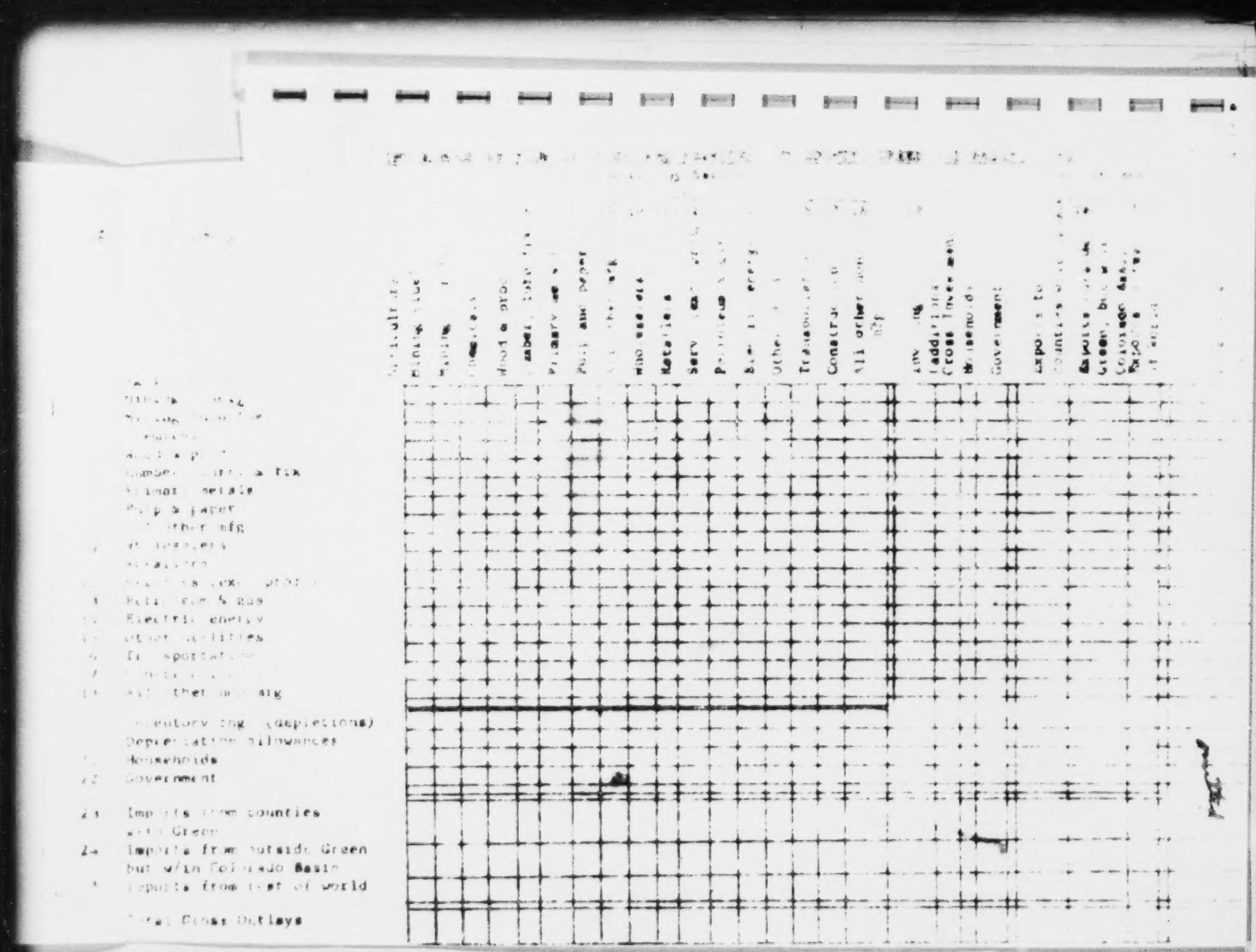
A. Data collection and projections to 1965, 1980, and 2010 should be completed of all relevant economic and demographic variables for the Green sub-basin.

B. Collection of historical data for the Upper Main Stem will be substantially underway. However, field work cannot be undertaken there within the limits of this year's budget.

C. Certain historical data will have been gathered for all representative counties in the Colorado to enable us to present the relative position of the Green compared with the entire Colorado basin.

D. Studies of the resource base for particular industries falling within the heavy water user category will be completed, which will attempt to project future location and water use of these industries in the Green.

E. A detailed input-output table illustrating the intersectoral and geographic relationships of the economy of the Green sub-basin will be completed. This will permit us to trace in detail the impact of alternative levels of economic activity upon the entire regional economy in an internally consistent fashion. This unique characteristic of input-output analysis will be extremely important because it will show the impact of both direct and indirect changes upon the heavy water users.



Activity: Hydrologic Studies.

Purpose: To define the present and future patterns of stream flow in the Basin.

Accomplishments:

FY 1963 to date: Discussions have been held with Mr. Frank Rainwater, Headquarters Hydrologist, and with the U. S. Geological Survey concerning the approaches to the hydrologic studies. [redacted] the Bureau of Reclamation has been contacted to obtain their plans for reservoir operations. For specific areas where special studies have been made, for example the Price River Basin and Animas-La Plata Basin, USGS streamflow data have been analyzed to determine flow patterns.

Balance of FY 1963: With the assistance of Mr. Rainwater, definite plans will be formulated for the analysis of data for key locations. It may be necessary to arrange to use computer services for this work.

Plans for FY 1964:

Hydrologic studies will be completed in the Upper Main-Stem, Green, and San Juan Sub-Basins and at such point in the remainder of the Colorado River Basin as are needed for flow regulation studies during the year.

Activity: Analysis of historical U. S. Geological Survey water quality data.

Purpose: To find any changes in chemical quality in relation to location, season, period of record, or as a general function of discharge, and to give a basis for prediction of future quality.

Accomplishments:

FY 1963 to date. The results from the first stage machine data analysis, completed in the spring of 1962, have been partially analyzed and interpreted. From this analysis, a second stage computer run was planned and attempts were made to have it carried out at SEC. The request for computer assistance was made to SEC in July and answered in October to the effect that the cost would be $15,000 and would take one year in time. Since this cost and time were untenable, other arrangements were necessary and have been made with the Radiological Health Center in Rockville, Maryland.

Balance of FY 1963. It is presently planned to have the second stage machine data analysis completed by early March. The results will then be analyzed and interpreted.

The second stage machine data analysis to be carried out in the near future includes the following programs:

1. A trend analysis by dry and wet seasons in order to determine if there is a significant change in quality through time.

2. Machine plotting of concentration vs. flows and the fitting of defined curves to these plots in order to establish a basis for predicting levels of concentrations at various flows.

3. Frequency analysis for all constituents to show the percent of time various levels of concentrations are exceeded.

4. Determining the predominant anion and cation at each station as an indicator of natural influences on water quality.

5. Find weighted concentrations and weighted flow rates for sodium, calcium, and magnesium for the purpose of analyzing the data so that it may be related to parameters affecting water quality.

Activity: Analysis of historical U. S. Geological Survey water quality data (continued)

Plans for FY 1964:

The second stage computer results will continue to be analyzed and interpreted. Future computer analyses are not envisioned at this time.

Activity: Development of Inventory on Municipal and Industrial Water Use and Waste Discharges in the Basin.

Purpose: To locate points of water use and waste discharge, determine quantities involved, waste characteristics, and analyze effects of discharges on water uses.

Accomplishments:

Collected supplemental basic data in conjunction with summer field surveys. Tabulated and summarized basic data in Green Sub-Basin.

Balance of FY 1963: Continue filling data gaps where necessary. Summarize and analyze basic data in Upper Main-Stem Sub-Basin.

Overall summary: Have obtained all inventory data from the State health departments of the basin and from major communities. Municipal basic data collection is essentially complete. A list of manufacturers of the basin has been compiled. Industrial data is about 70 percent complete. Industrial data collection by sub-basins expected by the end of FY 1963 is as follows: Upper Main-Stem - 100%; Green - 95%; San Juan - 90%; Little Colorado - 50%; Lower Main-Stem - 50%; Gila - 30%.

Activity: Establishment of Water Quality Objectives for the Colorado River Basin

Purpose: Development of Water Quality Management Program for Basin

Accomplishments:

FY 1963 to date. Discussed proposed objectives with Mr. George Burke of Headquarters. A preliminary draft of the proposed objectives were prepared for the consideration of the Conferees in February.

Balance of FY 1963. Will review draft of objectives with State and Federal officials to obtain the views of these agencies.

Plans for FY 1964:

Will obtain the approval of the Conferees in arriving at satisfactory water quality objectives.

Activity: Water Quality Management Program for Upper Main-Stem

Purpose: To determine methods for securing the best possible water quality for multiple water use. The programs developed serve as guides for the conference in progress and other enforcement actions which may be instituted subsequently, and to State and Federal agencies having an interest in the prevention and control of water quality degredation.

Accomplishments:

FY 1963 to date. A number of studies which relate specifically to the Upper Main-Stem water quality management program were carried out. These are as follows:

1. Water quality network to study overall salinity.

2. Field survey to study salinity in the Gunnison River Basin.

3. Field survey to study dissolved oxygen and stratification in lakes.

4. Collection of demographic and economic data for the economic base study of sub-basin.

Many other facets of project work relate to the Upper Main-Stem but also relate to other basins. Examples are the computer analyses of water quality data, preparation of inventories of basic data, hydrologic studies, water quality objections, etc. Field work is essentially completed for this sub-basin.

Balance of FY 1963. Continuation of sampling for water quality network. Continuation of data collection for economic base study of sub-basin.

Plans for FY 1964:

A large portion of the water quality management program for the Upper Main-Stem Sub-Basin will be completed. This will include the completion of such essential elements as the economic base study, hydrologic studies, future water use and waste discharge projections, and the determination of the effects of waste discharges on water quality. The final report for the sub-basin will be initiated.

Activity: Animas-La Plata Water Quality Study

Purpose: This is a pilot study to develop a water quality management plan for the study area.

Accomplishments:

FY 1963 to date: The economic base study has been completed and forwarded to Headquarters for review and comments. Analysis of water quality data collected during the survey of July-August 1961 has continued. A geological and ground water reconnaissance study was carried out.

Balance of FY 1963: The final report will be completed.

Plans for FY 1964:

No activities are planned.

Activity: Gunnison River Basin Water Quality Study

Purpose: This survey was primarily conducted to evaluate the effects of extensive irrigation on the water quality of the Gunnison River system and the associated problem of salinity buildup in the river system. Data obtained will be used in the preparation of the Upper Main-Stem water quality management plan.

Accomplishments:

1. FY 1963 to date. A 2-week field survey of the area was conducted in August-September 1962. The laboratory data has now been received and is in the preliminary analysis stage.

2. Balance of FY 1963. Data analysis and evaluation will continue with emphasis placed on the irrigation effects on water quality.

Plans for FY 1964:

A report on the water quality of the Gunnison River Basin will be prepared.

Activity: Grand Valley Area Water Quality Study

Purpose: This survey was conducted to provide water quality data during the height of the irrigation season and to further define the problem of salinity buildup in the associated reach of the Colorado River. Data obtained will be used in the preparation of the Upper Main-Stem water quality management plan.

Accomplishments:

1. FY 1963 to date. A 2-week field survey was conducted during August 1962. Preliminary laboratory data were received in December 1962 and evaluation of this information has begun.

2. Balance of FY 1963. Data analysis will continue and these results will be compared with those of the previous Spring 1962 survey in this area. This comparison will aid in defining the seasonal effects of irrigation on the water quality of the Colorado River.

Plans for FY 1964:

A detailed report will be prepared. It is expected that this report will encompass both surveys which have been conducted in this area.

Activity: Study of Stratification and Chemical Conditions in Two Selected Reservoirs.

Purpose: The reservoir studies were conducted to obtain information on chemical conditions and the extent of chemical, thermal and dissolved oxygen stratification existing in these two reservoirs. The Project will be assisted in evaluation of proposed reservoirs in relation to reservoir construction, flow regulation and pollution control studies. The data obtained will also be used in the preparation of the Upper Main-Stem water quality management plan.

Accomplishments:

1. FY 1963 to date. Short-term studies were conducted on Taylor Park Reservoir and Lake Granby during August 1962. Sampling was carried out at various locations and depths over a three-day period on each reservoir. Temperature and dissolved oxygen data have been reviewed and the stratification patterns with relation to these two parameters have been evaluated. A report covering the two reservoirs is in the first stage of development.

2. Balance of FY 1963. Analyses of additional data obtained during the surveys will be completed. This includes pH, alkalinity, conductivity, and BOD data. The report covering the results and interpretations resulting from the surveys will be completed.

Plans for FY 1964:

Additional studies of this type will be considered for FY 1964.

Activity: Water Quality Network in Upper Main-Stem.

Purpose: To fill data gaps in USGS water quality data in order to assist in relating changes in salinity to causes.

Accomplishments:

FY 1963 to date: Grab samples were taken at about 22 primary locations once a month since July 1962. (See attached map). In addition, field conductivities were obtained at about 20 other secondary locations. Results are just beginning to arrive.

Balance of FY 1963: Collection of samples at the same locations are planned during February and May 1963.

Plans for FY 1964:

No sampling activities planned. Data will be analyzed in conjunction with other chemical quality data for the Upper Main-Stem.

Activity: Water Quality Management Program for Green Sub-Basin

Purpose: To determine methods for securing the best possible water quality for multiple water use. The programs developed serve as guides for the conference in progress and other enforcement actions which may be instituted subsequently, and to State and Federal agencies having an interest in the prevention and control of water quality degredation.

Accomplishments:

FY 1963 to date. The economic base study for the Green Sub-Basin was initiated in September 1962 and is progressing satisfactorily. Inventory data was summarized by water sheds. The study of the Price River for the Corps of Engineers relates directly to the water quality management program to the Green Sub-Basin.

Balance of FY 1963. The first draft of the economic base study report will be completed.

Plans for FY 1964:

A large portion of the water quality management program for the Green Sub-Basin will be completed. This will include the completion of such essential elements as the economic base study, hydrologic studies, future water use and waste discharge projections, and the determination of the effects of waste discharges on water quality. The final report for the sub-basin will be initiated.

Activity: Study of Salinity in the Colorado River System

Purpose: The overall salinity study has four broad objectives:

1. To ascertain present and probable future levels of salinity in surface waters throughout the Colorado River Basin.

2. To identify present and probable future major sources of salinity.

3. To determine the present and probable future physical and economic significance of salinity in surface waters.

4. To recommend various measures and/or approaches whereby salinity sources can be controlled.

Accomplishments:

FY 1963 to date. Salinity is one of the largest single contributors to pollution of waters in the Colorado River system. Long-term water quality data collected by the U. S. Geological Survey at various sampling points in the Colorado River Basin show that levels of salinity are above desirable limits for many legitimate water uses. In addition, personnel from the Colorado River Basin Project have collected chemical data in a number of areas in the Basin. High concentrations of salinity were noted in almost all cases. The most severe situation was noted in the Yuma, Arizona area where it became necessary to abandon the Colorado River as a source of domestic water supply. A further indication of the salinity problem in Colorado River waters is the Mexican charge that extensive crop damages have resulted from using this water for irrigation. The three conferences on the matter of Pollution of the Interstate Waters of the Colorado River and its Tributaries have strongly emphasized the need for evaluation of the salinity problem with an aim to suggesting means of controlling this source of pollution.

Accomplishments to date have been limited primarily to the collection of background data and the formulation of a large scale study proposal. These include:

1. A research proposal for evaluating return irrigation flows as a source of in-stream salinity was submitted to the PHS Taft Engineering Center in March 1962.

2. A continuing study of the salinity problem at Yuma, Arizona is underway. One report has been released and one additional report is in preparation.

Activity: Salinity in the Colorado River System (continued)

3. A two-stage study of salinity in irrigation return flows in the Grand Junction, Colorado area was carried out in 1962; a report on this study effort is in preparation.

4. An intensive two-week field study of present salinity in the Gunnison River Basin was carried out during the peak irrigation period of 1962.

5. By use of a rapid data computer, USGS water quality data are being analyzed in order to determine trends in salinity levels in the Colorado River system over the period of record.

6. Detailed maps of irrigated lands in the Colorado River Basin in 1959 are under preparation, on a reimbursement agreement basis, by the Economic Research Service of the U. S. Department of Agriculture.

7. A water quality network was established in the Upper Main-Stem Sub-Basin to obtain supplemental salinity data on a seasonal basis.

8. Data from the 1959 Census of Irrigation, by major crops grown, have been summarized by counties and sub-basins.

9. A planning meeting was held with Dr. William McDaniel, University of New Mexico and Dr. Allen Kneese, Resources For The Future, Inc. in November 1962 in order to establish liaison for coordinating the Project's salinity study with the proposed RFF/New Mexico University study of salinity in the Colorado River Basin. Informal discussions in regard to the Colorado River salinity problem have also been held with Dr. Robert Whitney, Chairman, Department of Agronomy at Colorado State University, Dr. Maurice Kelso, Professor of Agricultural Economics at the University of Arizona and Mr. Kirk Sandals, Southwest River Basin Representative, U. S. Department of Agriculture.

10. A bibliography of technical reports which deal with irrigation is presently under preparation.

11. A list of potential salinity consultants has been compiled.

12. A series of planning meetings for formulating the salinity study have been held at the Project level.

Activity: Salinity in the Colorado River System (continued)

Balance of 1963.

1. Complete evaluation of available basic data for determination of historical trends in salinity levels in the surface waters of the Colorado River Basin.

The major source of data will be the long-term water quality data available for USGS. Supplemental sources of data, including results from the Project's Upper Main-Stem Water Quality Network, a series of short-term field studies, and other available data, will also be utilized. Preparation of a progress report covering this phase of the study will be initiated.

2. Establish liaison with Federal, State and local agencies having an interest in and/or responsibility for the salinity problem in the Colorado River system. These include:

a. USDA Salinity Laboratories at Riverside, California and Tempe, Arizona
b. U. S. Geological Survey and Bureau of Reclamation of the U. S. Department of Interior
c. Soil Conservation Service and Economic Research Service of the U. S. Department of Agriculture
d. Various State agencies
e. Local interest groups

Attempts will be made to engage in cooperative study efforts where feasible and/or desirable.

3. Establish telephone contact with a number of salinity specialists to be followed by personal visits where appropriate. This will be done in order to coordinate the Project effort with individual studies by these personnel now underway or planned in the immediate future. It is anticipated that a Salinity Advisory Committee to provide continued services to the Project will be established.

4. Green and Upper Main-Stem Sub-Basins--Plan program to identify sources of salinity.

5. Complete final work plans for FY 1964, following the determination of salinity levels in the Colorado River system on a broad basis and after review of the results of this study phase with various salinity specialists.

Activity: Study of Salinity in the Colorado River Basin (continued)

Long-Range Plans:

1. Steps will be taken to complete objective (1) listed above to a satisfactory degree of detail.

As a minimum, salinity levels should be determined at the junction of all major tributaries and the mainstem of the Colorado River. In addition, however, salinity levels at interstate stream points and significant intrastate stream points would be desirable. Historical trend data, relation to hydrologic variations, will be evaluated to serve as a base for projecting probable future salinity levels. This phase of the study will entail considerable office work and additional field investigations.

2. Determination of major sources of salinity and their location will proceed concurrently with the completion of item (1) listed above.

Analysis of changes in salinity levels at various points in the river system may indicate the need for the establishment of a number of short-term sampling stations. Initial efforts will be limited to the Green River and Upper Main-Stem Sub-Basins so that data will be developed early enough to be incorporated into the water quality management program reports for these two sub-basins. This phase of the study will require personnel skilled in geology, soils and irrigation--much of this talent may have to be obtained through contract and/or consulting arrangements.

3. Development of methodology for projecting salinity levels at various points in the river system under a variety of assumed future economic conditions will have to be initiated at an early date.

This effort will require personnel skilled in hydro-geology, econometrics, agronomy and allied fields. It is anticipated that much valuable assistance can be obtained from the University of New Mexico study of salinity in the Colorado River.

4. The determination of present and future physical and economic significance of various levels of salinity throughout the Colorado River Basin will have to precede the "corrective action" suggestion phase.

For example, at the present time it appears more important to correct the salinity problem in some areas of the basin than in others.

Activity: Study of Salinity in the Colorado River System (continued)

5. The suggestions of "corrective action" phase becomes the end product of the overall salinity study.

In practice, however, efforts on this phase of the study will be carried out concurrently with the other study phases. It will perhaps be the most difficult aspect of the study because of the rapidly changing technology in this field of endeavor.

6. Preparation of progress reports will be a continuing effort. Due to the "ground breaking" aspect of this study, significant findings will be published as they are developed, and wide distribution to interested persons will be made. Careful liaison with other Federal and State agencies will be needed in the preparation of final reports, particularly those in which corrective action is suggested.

Activity: Identification of principal sources of salinity in the Upper Main-Stem and Green Sub-Basins.

Purpose: Development of field data and other necessary information in the Upper Main-Stem and Green Sub-Basins as a part of the overall study of salinity in the Colorado River Basin.

Accomplishments:

1. FY 1963 to Date

A. A two-stage study of salinity in the Grand Junction, Colorado area was undertaken during February and August, 1962. Samples were collected both during irrigation and non-irrigation seasons to determine salinity contributions from land irrigation and other sources. Analysis of this data is in the initial phases. A report will be issued during FY 1964.

B. An intensive two-week field study of water quality conditions in the Gunnison River Basin was undertaken in August of 1962. This study coincided with the period of peak irrigation in the Gunnison River Basin and will provide data on contributions of salinity to surface supplies from irrigation and other sources. Analysis of this data is in the initial phases. A report will be issued during FY 1964.

C. A water quality network consisting of 42 stations sampled on a once-a-month basis was initiated in July, 1962, for important streams of the Upper Main-Stem Sub-Basin. The data to be obtained by this network is intended to supplement the long-term USGS water quality data in relation to salinity conditions of surface waters within this sub-basin. Analysis of this water quality data has not been started.

D. Office work has been initiated on further analysis of USGS long-term water quality data from the Project's first stage IBM computer run to provide background data on sources and magnitudes of salinity.

E. Data on irrigated lands within the Basin have been summarized by counties and sub-basins as derived from the 1959 Census of Irrigation.

2. Balance of FY 1963. Available background data will be collected and analyzed. The advice and consultation of experts principally with the U. S. Department of Agriculture and with Western universities who have undertaken studies of salinity as it relates to water quality will be solicited by

Activity: Identification of principal sources of salinity in the Upper Main-Stem and Green Sub-Basins. (continued)

the Project. The full-scale salinity program to be developed in the near future will consider the initial field activities to be carried out in the Green and Upper Main-Stem Sub-Basins. Details will be given on the number, type, and duration of sampling stations to be employed in the Green and Upper Main-Stem Sub-Basins. It is anticipated that field data on quality of surface waters will be collected at a number of locations on each main river and at a minimum of one location on each important tributary stream.

Plans for FY 1964:

The Upper Main-Stem and Green Sub-Basins will receive continued attention in FY 1964 in regard to the field investigations to be undertaken for delineating sources and magnitude of salinity contributions. The field planning, briefly described above, will be put into operation, and further implementation and modification of sampling networks will be made according to indicated needs. Field surveys, generally of limited duration, will be conducted to pinpoint sources and quantities of salinity contributions. The preliminary data collection and analyses will be directed toward segregation of general areas of high, intermediate or low salinity contribution. Subsequent field studies will provide specific data on pinpointing and accurate measurement of singular sources of salinity contributions.

Activity: Interstate Stream Pollution Studies

Purpose: Study of the Water Quality in Interstate Streams of the Colorado River Basin to define the type of pollution problems that may exist.

Accomplishments:

1. FY 1963 to date. Summary reports concerning the quality of interstate waters are prepared by the various Regional Offices under an existing program. The PHS Regional Offices of Region VII, VIII and IX have undertaken study of waters of the Colorado River Basin. These reports give major attention to municipal and industrial wastes and their effect on water uses. Much of this information is obtained from State Water Pollution Control Agencies when it is available. In most cases, the Regional Offices and the various States do not have adequate laboratory facilities and support and therefore water quality data for these streams is limited. In some cases, the Project has furnished analytical results to the Regional Offices. The latter information has filled important gaps encountered in preparation of Summary Reports.

The problem of salinity is not covered adequately by Summary Reports. The Project is giving major emphasis to the evaluation of salinity within the Basin. These salinity studies will give important data in the area of interstate waters.

The first step in the program of interstate stream pollution studies as undertaken by the Project is to conduct meetings between the Project and each of the PHS Regional Offices of Regions VII, VIII and IX. The objectives of these meetings are to (1) discuss the existence and interchange of interstate stream water quality data; (2) establish priorities of study for interstate streams within the Basin; and (3) discuss assistance that the Regional Offices can provide on necessary field investigations.

A meeting was conducted with Region VIII in November, 1962. A coordinated approach of activities toward interstate stream studies was developed at that time. The Project and the Regional Office will cooperatively determine the sufficiency of current information available for particular streams and a priority of study for streams will be established by the Project. If a probable interstate pollution problem is indicated from the evaluation of available data, a reconnaissance or short-term field survey will be undertaken. In the event

Activity: Interstate Stream Pollution Studies (continued)

that a further study or full-scale investigation is required, this will be conducted by the Project with assistance from the Regional Office. Joint cooperation between the Project and the Regional Office will aid the Project in its efforts to assess quality of interstate streams and aid the Regional Offices in their preparation of Summary Reports.

2. Balance of FY 1963. The Project in the very near future plans to undertake meetings with the PHS Regional Offices of Regions VII and IX to develop a cooperative plan on study of quality of interstate waters. It is hoped that an approach similar to that developed with Region VIII will be suitable to Regions VII and IX. The Project will soon thereafter initiate its detailed study program in cooperation with the Regional Offices and the various Basin States.

Plans for FY 1964: This activity will continue for a major portion of FY 1964.

Activity: Ground Water Studies in the Vicinity of Uranium Mills

Purpose: To assess the potential contamination of ground waters used for domestic water supply in the vicinity of uranium mills.

Accomplishments:

1. FY 1963 to date: Beginning in the spring of 1962, visits were made to all but one of the uranium mills in the Basin. At some of the mills samples were collected of ground waters. At the other mills observations were made of possible effects of waste disposal upon nearby ground waters and discharges to surface streams from underlying non-potable aquifers. A report of these studies has been prepared in draft form for review.

2. Balance of FY 1963: A final report will be issued on the above investigations around March 1, 1963.

In conjunction with the brief surveys in the Uravan and Monticello areas, ground water samples will continue to be collected and analyzed for mineralogical and radiological content.

Plans for FY 1964:

No activities are planned at this time.

Activity: Investigation of Aggregate Future Water Demand for the Price River Basin.

Purpose: This is a study of the aggregate water demand for the Price River Basin to help in the planning of multiple-purpose water storage and flood control projects.

Accomplishments:

FY 1963 to date. Carried out field work in the Basin and analyzed published data for a preliminary report which was finished in November. Also discussed the report with State and Federal officials in Utah.

Balance of FY 1963. The report will be summarized and analysis of the most probable growth path will be included. This report will then be submitted to the Corps of Engineers, following Headquarters approval.

Plans for FY 1964:

At present there are no plans for additional work.

Activity: Stream Flow Regulation Studies

Purpose: To provide the Bureau of Reclamation and Corps of Engineers with information on the need for and value of storage in proposed reservoirs for the purpose of water quality control. This is in accordance with section 2b of Public Law 660, as amended by Public Law 87-88.

Accomplishments:

FY 1963 to date. Arrangements have been made for reimbursement from Bureau of Reclamation offices in Salt Lake City, Utah and Boulder City, Nevada to carry out flow regulation studies for the Bureau. These studies and preparation of special reports have been carried out by the Water Quality Management Program personnel with economic assistance from the Economic Studies personnel. This additional work, of course, reduced the regular Water Quality Management Program work originally scheduled for this year. Reports have been completed for the following projects in the Colorado River Basin since July 1962:

Project	Location	Agency	Reimbursement
Alamo Reservoir	Arizona	Corps of Engineers	$ 0
Bridge Canyon	Arizona	Bureau of Reclamation	500
Dolores	Colorado	Bureau of Reclamation	500
Fruitland Mesa	Colorado	Bureau of Reclamation	0
Lyman	Wyoming	Bureau of Reclamation	1,000
Marble Canyon	Ariz.-Utah	Bureau of Reclamation	500
Senator Wash	Calif.-Arizona	Bureau of Reclamation	2,000

Balance of FY 1963. A new section within the Colorado River Basin Water Quality Control Project will be established by March 1963 in order to carry out the large workload of flow regulation studies in the Basin. Suitable personnel will be recruited for this section. During the Fiscal Year 1963 reports will be written for the following projects in the Colorado River Basin. For those projects not completed, status reports will be written.

Activity: Stream Flow Regulation Studies (Continued)

Project	Location	Agency	Degree of Completion	Reimbursement
Southern Nevada	Nevada	Bur. of Reclamation	Completed	1,000
Dallas Creek	Colorado	Bur. of Reclamation	Initiated	4,000
San Miguel	Colorado	Bur. of Reclamation	Initiated	2,000
Jensen Unit-Cen. Utah	Utah	Bur. of Reclamation	Initiated	1,000
Upalco Unit-Cen. Utah	Utah	Bur. of Reclamation	Initiated	1,000
Upper Gila River	Ariz.-N.M.	Bur. of Reclamation	Initiated	1,000
Maxwell	Arizona	Bur. of Reclamation	Initiated	2,000
San Pedro	Arizona	Bur. of Reclamation	Initiated	500

Plans for FY 1964:

Based on budget developed and recruitment success, work on the following projects is planned.

Project	Location	Agency	Degree of Completion
Upper Gila River	Ariz.-New Mexico	Bur. of Reclamation	Completed
Jensen Unit-Cen. Utah	Utah	Bur. of Reclamation	Completed
Upalco Unit-Cen. Utah	Utah	Bur. of Reclamation	Completed
Dallas Creek	Colorado	Bur. of Reclamation	Completed
Gray Canyon	Utah	Bur. of Reclamation	Completed
San Miguel	Colorado	Bur. of Reclamation	Completed
West Divide	Colorado	Bur. of Reclamation	Completed
Battlement Mesa	Colorado	Bur. of Reclamation	Initiated
Maxwell	Arizona	Bur. of Reclamation	Initiated
San Pedro	Arizona	Bur. of Reclamation	Initiated
Basalt	Colorado	Bur. of Reclamation	Initiated
Bluestone	Colorado	Bur. of Reclamation	Initiated
Yellow Jacket	Colorado	Bur. of Reclamation	Initiated
Central Arizona	Arizona	Bur. of Reclamation	Initiated

Activity: Technical economic assistance to the Flow Regulation Studies Group.

Purpose: Section 2(b) of the Federal Water Pollution Control Act requires that the views of the Secretary of Health, Education, and Welfare, in regard to "the need for and value of storage" for the purpose of water quality control "shall be set forth in any report or presentation to Congress proposing authorization or construction of any reservoir including such storage."

For all such reservoirs in the Colorado River Basin, the Economic Studies group will:

1. Provide a basis for determining and "need for storage" by developing projections of long-range population and economic development in the impact areas, which in turn are used by the Flow Regulation Studies group to estimate future pollution loadings in the affected streams.

2. Determine the "value of storage" for purposes of water quality control and will provide supporting data upon which such value determinations are based.

Accomplishments:

FY 1963 to date:

1. Prepared the economic section in flow regulation reports for the proposed Lyman and Dolores Projects of the Bureau of Reclamation.

2. Provided editorial review comments, from the economic specialty viewpoint, for letter-type flow regulation reports on the Alamo Project of the Corps of Engineers, and the Bridge Canyon, Fruitland Mesa, and Marble Canyon Projects of the Bureau of Reclamation.

3. Initiated the tabulation of economic trend data for the impact areas of the proposed Dallas Creek and San Miguel Projects of the Bureau of Reclamation in Colorado.

4. Prepared formal review comments, from the economic specialty viewpoint, on the Soil Conservation Service report on the proposed Boulder Lake Project (Public Law 566) in Wyoming.

Activity: Technical economic assistance to the Flow Regulation Studies Group (continued)

Balance of FY 1963:

1. Carry out a field reconnaissance of the proposed Dallas Creek, San Miguel and West Divide Project areas of the Bureau of Reclamation in Colorado.

2. Complete the economic sections of flow regulation reports on the above listed projects.

3. Initiate economic studies of the proposed Jensen and Upalco Projects of the Bureau of Reclamation in Utah.

Plans for FY 1964:

Complete the economic sections of flow regulation reports for the following proposed projects:

1. Jensen-central Utah
2. Upalco-central Utah
3. Upper Gila-western New Mexico
4. Grey Canyon-eastern Utah
5. Battlement Mesa-western Colorado
6. San Pedro-southern Arizona
7. Yellow Jacket-northwestern Colorado
8. Maxwell-southern Arizona

Initiate economic studies of the proposed Basalt and Bluestone projects in western Colorado.

WATER QUALITY MANAGEMENT PROGRAM - MANPOWER DEPLOYMENT CHART
January 1963 to June 1963

	January	February	March	April	May	June
Water Quality Objectives				1/4 man mo. Pahren-1/4		1/4 man mo. Pahren-1/4
Basic Data Questionnaires	1/4 man mo. Heaney-1/4	1/2 man mo. Heaney-1/2				
Analysis	1 man mo. Heaney-1/2 Rivenes-1/2	3/4 man mo. Heaney-1/4 Rivenes-1/2			1 man mo. Heaney-1	2 man mo. Heaney-1 Rivenes-1
Computer Analysis	1/2 man mo. Meek-1/2	1/2 man mo. Meek-1/2	1-1/2 man mo. Heaney-1 Rivenes-1/2	1-1/2 man mo. Heaney-1 Rivenes-1/2		
Hydrology					1/2 man mo. Meek-1/2	1/2 man mo. Meek-1/2
Animas-La Plata Report			1/2 man mo Meek-1/4 Rivenes-1/4	1-3/4 man mo. Pahren-1/4 Meek-1[redacted] Rivenes-1/2	1 man mo. Pahren-1/4 Meek-1/4 Rivenes-1/2	
Price River Report	1/4 man mo. Meek-1/4	1/2 man mo. Meek-1/4 Heaney-1/4	1 man mo. Meek-[redacted] 1/2 Pahren-1/4 Rivenes-1/4			
Senator Wash Report	3/4 man mo. Pahren-1/2 Rivenes-1/4					
Southern Nevada Report		1/4 man mo. Pahren-1/4				
Administration	2-1/4 man mo. Pahren-1/2 Meek-1/4 Heaney-1/4 Rivenes-1/4 Pearson-1	2-1/2 man mo. Pahren-3/4 Meek-1/4 Rivenes-1/2 Pearson-1	2 man mo. Pahren-3/4 Meek-1/4 Pearson-1	1-1/2 man mo. Pahren-1/2 Pearson-1	2-1/2 man mo. Pahren-3/4 Meek-1/4 Rivenes-1/2 Pearson-1	2-1/4 man mo. Pahren-3/4 Meek-1/2 Pearson-1
TOTALS	5 man mo.	5 man mo.	5 man mo.	5 man mo.	5 man mo.	5 man mo.

WATER QUALITY MANAGEMENT PROGRAM - MANPOWER DEPLOYMENT CHART
July 1963 - December 1963

	July	August	September	October	November	December
Hydrologic studies	1 man mo. Meek-1	1 man mo. Meek-1	1 man mo. Meek-1	1 man mo. Meek-1	1/4 man mo. Meek-1/4	1/4 man mo. Meek-1/4
Effect of water use on quality (Upper Main-Stem)	2-1/2 man mo. Heaney-1 Rivenes-1 Pahren-1/2	2-1/2 man mo. Heaney-1 Rivenes-1 Pahren-1/2	1-1/4 man mo. Heaney-1/4 Rivenes-1	1 man mo. Heaney-1/4 Rivenes-1/2 Pahren-1/4		
Effect of water use on quality (Green)			1 man mo. Heaney-3/4 Pahren-1/4	1-1/4 man mo. Heaney-3/4 Rivenes-1/2	2 man mo. Heaney-1 Rivenes-1	1-3/4 man mo. Heaney-1/2 Rivenes-1 Pahren-1/4
Projection of water use and wastes (Green)					1 man mo. Meek-3/4 Pahren-1/4	3/4 man mo. Meek-3/4
Administration	1-1/2 man mo. Pahren-1/2 Pearson-1	1-1/2 man mo. Pahren-1/2 Pearson-1	1-3/4 man mo. Pahren-3/4 Pearson-1	1-3/4 man mo. Pahren-3/4 Pearson-1	1-3/4 man mo. Pahren-3/4 Pearson-1	2-1/4 man Pahren-3/4 Heaney-1/2 Pearson-1
TOTALS	5 man mo.	5 man mo.	5 man mo.	5 man mo.	5 man mo.	5 man mo.

WATER QUALITY MANAGEMENT PROGRAM - MANPOWER DEPLOYMENT CHART
January 1964 - June 1964

	January	February	March	April	May	June
Hydrologic Studies	1/4 man mo. Meek-1/4	1/4 man mo. Meek-1/4	1/4 man mo. Meek-1/4	1/4 man mo. Meek-1/4	1/4 man mo. Meek-1/4	1/4 man mo. Meek-1/4
Projection of water use and wastes (Green)	1 man mo. Meek-3/4 Pahren-1/4					
Projection of water use and wastes (Upper Main-Stem)		1 man mo. Meek-3/4 Pahren-1/4	3/4 man mo. Meek-3/4	1 man mo. Meek-3/4 Pahren-1/4		
Initiate final report (Green)	2-1/4 man mo. Heaney-1 Pahren-1/4 Rivenes-1	2 man mo. Heaney-1 Rivenes-1	2-1/2 man mo. Heaney-1 Rivenes-1 Pahren-1/2	2-1/4 man mo. Pahren-1/4 Heaney-1 Rivenes-1	1-3/4 man mo. Meek-3/4 Heaney-1	1-3/4 man mo. Pahren-1/4 Meek-1/2 Heaney-1
Initiate final report (Upper Main-Stem)					1-1/4 man mo. Pahren-1/4 Rivenes-1	1-1/2 man mo. Pahren-1/4 Meek-1/4 Rivenes-1
Administration	1-1/2 man mo. Pahren-1/2 Pearson-1	1-3/4 man mo. Pahren-3/4 Pearson-1	1-1/2 man mo. Pahren-1/2 Pearson-1	1-1/2 man mo. Pahren-1/2 Pearson-1	1-3/4 man mo. Pahren-3/4 Pearson-1	1-1/2 man mo. Pahren-1/2 Pearson-1
TOTAL MAN-MONTHS	5 man mo.	5 man mo.	5 man mo.	5 man mo.	5 man mo.	5 man mo.

MANPOWER DEPLOYMENT CHART (IN MAN-MONTHS) (Cont.)
ENGINEERING STUDIES - COLORADO RIVER BASIN PROJECT
July 1, 1963 - June 30, 1964

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
Yuma Network and Report						O&M	EK-1/2						
							IA-1/4						0.75
Animas-San Juan-LaPlata Report						Nothing Planned							
Hydrogeology (Ground-water Basins, Salinity Work, Initial Erosion Work)				SS-8 ES-1 EP-1									
Additional Ground Water Studies				JA-3/4									
Other				LE-3/4									11.5
Salinity Program (Tentative)	2 large scale, short-term surveys ES-1/2; LR-2-1/2; EP-1-1/2; IA-1-1/4; EK-1-1/2; LE-1-1/2												
	Set up O & M Chemical Monitoring or WQN Stations ES-1/2; LR-1/2; JA-1/2; EK-1/2; EP-1/2												20.0
	Visits, Consultation: ES-1-1/4 Data Analysis: HD-1/2; EK-1-3/4; JA-1-3/4 Survey: Other: EK-1/2; LE-3/4; EP-1/4; LR-1/4												
Report on Upper Lakes (1962 Work)	ES-1/4	LE-1	ES-1/4										
	LR-1/2	JA-1/2	EP-1/2	LE-1/2									3.5
Reports for Large Field Studies (1962)	IA-1/2						LE-1/2	LR-2		LR-1/2			
	LR-1/2			LE-2	EP-1		EP-1/2	IA-1		IA-1/2			
	ES-1/4			JA-1	ES-1/2		ES-1/4	JA-1	ES-1/2	ES-1/4			12.75
	GV Report			Dol-SM Report			D-SM	Gunnison		Gunnison Rept.			
Salinity Recorders	EK-1-1/2; EP-3/4; LE-1/2												2.75
Consultation of Chief Engineer						ES-1							1.0
Annual and Sick Leave; lost time - replacements		9 @ 1 = 9 + 2 = 11				All + 11							11.0
Administrative Work		9 @ 1/2 = 4-1/2				All + 4-1/2							4.5
													108.0

Key: ES-Struzeski
LR-Reed or replacement
SS-Spiegel
[illegible] Cash or replacement
LE-Esvelt
IA-Adler
HD-Dawson
EK-Korolevich
JA-Alvarez

MANPOWER DEPLOYMENT CHART (IN MAN-MONTHS)
ENGINEERING STUDIES - COLORADO RIVER BASIN PROJECT
July 1, 1963 - June 30, 1964

	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Total
Interstate Stream Pollution Studies			HE-6	ES-1/2				HD-2	ES-1/2		HD-2		11.0
Radium Monitoring Network O&M, Supplies & Report Writing		LR-1/4 IA-1/4				LR-1/4 IA-1/4	EK-1-1/2			LR-1/2 IA-1/2			3.5
Sediment Surveys				Survey:	EP-1 EK-1/2 ES-1/4				Report:		EP-1 IA-3/4 JA-1/2		4
Crop Surveys						Nothing Planned							
Shiprock Surveys						Nothing Planned							
Uravan-Monticello Short-Term Studies	EP-1 EK-1/2							EP-1/2 EK-1/2				EP-1/2	3.0
Uranium Mill Ground Water Studies							SS-3/4						0.75
Program Review Evaluation				ES-1/2 LR-1/4 LE-1/4 IA-1/2 JA-1/2 EK-1/2			ES-1/2 LR-1/2 LE-1/2 EP-1/2 JA-1/2			ES-1/2 LR-1/2 IA-1/2 JA-1			7.5
Lake Mead Survey (Reconnaissance and Survey)						LE-1-1/4 JA-1/2 IA-1 ES-3/4							
Field Work for Interstate Poll. Evaluation & Stream Flow Augmentation	IA-1/4 EK-1/4			ES-1/2 IA-1/2 EK-1/2 LR-1/2 SS-1/2			IA-1 JA-1				LR-1 SS-1		7.0

FLOW REGULATION STUDIES - MANPOWER DEPLOYMENT CHART
March 1963 - June 1963

Project	March	April	May	June
Dallas Creek	1/2 man-mo. Reed-1/2	1 man mo. Reed-1	1 man mo. Reed-1	
San Miguel	1/2 man mo. Coffey-1/2	1 man mo. Coffey-1	1 man mo. Coffey-1	
Upalco				1/2 man mo. Reed-1/2
Jensen				1/2 man mo. Reed-1/2
Upper Gila				1/3 man mo. Coffey-1/3
San Pedro				1/3 man mo. Coffey-1/3
Maxwell				1/3 man mo. Coffey-1/3

MANPOWER DEPLOYMENT CHART - FLOW REGULATION STUDIES SECTION
July 1963 - June 1964

	1963 July	Aug.	Sept.	Oct.	Nov.	Dec.	1964 Jan.	Feb.	Mar.	April	May	June
Dallas Creek	1/2 A	1/2 A										
West Divide	1/3 B	2/3 B	1 B	1 B	3/4 B	1/2 B						
San Miguel	2/3 B	1/3 B										
Upper Gila					1/4 B	1/2 B						
Jensen	1/4 A	1/4 A	1/2 A	1/2 A	1/2 A	1/4 A						
Upalco	1/4 A	1/4 A	1/2 A	1/2 A	1/4 A	1/4 A						
Battlement Mesa							1/2 A	1/2 A	1/2 A			
Maxwell							1/4 B	1/4 B	1/4 B	1/2 B	1/2 B	
San Pedro							1/4 B	1/4 B	1/4 B			
Gray Canyon					1/4 A	1/2 A						
Basalt										1 A	1 A	1 A
Bluestone										1/2 B	1/2 B	1 B
Yellow Jacket							1/2 A	1/2 A	1/2 A			
Central Arizona							1/2 B	1/2 B	1/2 B			

Personnel key:

A - Mr. Reed
B - Mr. Coffey

MANPOWER DEPLOYMENT CHART (IN MAN-MONTHS)
ECONOMIC STUDIES - COLORADO RIVER BASIN PROJECT
January 1963 - June 1963

Activity	January	February	March	April	May	June
ADMINISTRATIVE	1-1/4	1-3/4	1	1-1/4	1-3/8	1-1/2
Professional	1/2 CE SE	3/4 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE
Secretarial	3/4 S	1 S SC	1/2 S	3/4 S	7/8 S SC	1 S
Economic Studies - Water Quality Management Program	1-1/4	1-1/4	1-1/4	1	3/4	3/4
Contracts - ARMU/USDA	3/4 CE SE	1/2 CE SE	1/4 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE
Animas-La Plata Report		1/2 CE SE	1/2 CE SE	1/4 CE SE	1/8 CE SE	
Basic Data Tabulation	1/2 SE	1/4 SE	1/2 SC	1/4 SC	1/8 SC	1/4 SC
Economic Studies - Flow Regulation	1-1/4	1	1-1/4	2	2	2-1/4
Price River Project	1/4 CE	1/2 CE SE				1/4 CE SE
Dallas Creek Project	1/8 CE SE		1/2 CE SE	1/4 CE SE	1/8 SE	1/4 CE SE
San Miguel Project	1/4 CE SE		1/8 SE	3/8 SE	1/4 SE	1/4 SE
West Divide Project	1/8 CE SE		1/8 SE	1/8 SE	3/8 SE	1/4 SE
Jensen Project					1/4 CE SE	1/4 CE SE
Upalco Project					1/4 CE SE	1/4 CE SE
Basic Data Tabulation	1/2 SC	1/2 SC	1/2 SC	3/4 SC	3/4 SC	3/4 SC
TOTAL MAN-MONTHS						
Professional	2	2-1/4	2	2	2-3/8	2-1/2
Clerk-Steno	1-3/4	1-3/4	1-1/2	1-3/4	1-3/4	2

KEY: CE-Chief, Economic Studies; SE-Staff Economist; SC-Statistical Clerk; S-Stenographer

KEY: CE-Chief, Economic Studies
SE-Staff Economist
SC-Statistical Clerk
S-Stenographer

MANPOWER DEPLOYMENT CHART (IN MAN-MONTHS)
ECONOMIC STUDIES - COLORADO RIVER BASIN PROJECT
July 1, 1963 - June 30, 1964

Activity	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
ADMINISTRATIVE	1	1	1-1/4	1	1-1/4	1-1/4	1-1/4	1-1/4	1	1	1-1/4	1
Professional	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	3/4 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/4 CE SE	1/2 CE SE	1/2 CE SE
Stenographic	3/4 S SC	1/2 S	3/4 S SC	1/2 S SC	3/4 S SC	1/2 S SC	3/4 S	3/4 S SC	1/2 S	3/4 S SC	3/4 S	1/2 S
ECONOMIC STUDIES - WATER QUALITY MANAGEMENT PROGRAM	3/4	1	1-1/4	1-1/2	1-1/4	1-1/2	1-1/2	1-1/4	1	3/4	1-1/2	1-1/4
Contracts - ARMU/USDA	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/4 CE SE	1/4 CE SE	1/4 CE SE	1/2 CE SE
Green Sub-Basin Report			1/4 CE SE	1/2 CE SE	1/2 CE SE	1/2 CE SE	1/8 CE SE					
Upper Main-Stem Basin Report							1/2 CE SE	1/4 CE SE	1/4 CE SE	1/4 CE SE	1/2 CE SE	1/4 CE SE
Basic Data Tabulation	1/4 SC	1/2 SC	1/2 SC	1/2 SC	1/4 SC	1/2 SC	3/4 SC	1/2 SC	1/2 SC	1/4 SC	1/2 SC	1/2 SC
ECONOMIC STUDIES - Flow Regulation	1-3/4	1-1/2	1	1	1	1/2	1	1-1/4	1-1/2	1-3/4	1-1/4	1-1/4
Jensen Project	1/2 CE SE	1/2 CE SE	1/4 CE SE									
Upalco Project	1/2 CE SE	1/2 CE SE	1/4 CE SE									
Upper Gila Project			1/4 CE SE	1/2 CE SE								
Grey Canyon Project					1/2 CE SE							
Battlement Mesa Project						1/4 CE SE	1/4	1/4	1/4	1/2		
San Pedro Project							1/4	1/4	1/4	1/2	1/4	
Yellow Jacket Project							1/4 CE SE	1/4 CE SE	1/2 CE SE	1/4 CE SE	1/4	
Maxwell Project											1/8	1/4
Basalt Project											1/8 CE SE	1/4
Bluestone Project												1/4
Basic Data Tabulation	1/2 SC	1/2 SC	1/4 SC	1/2 SC	1/2 SC	1/4 SC	1/4 SC	1/2 SC	1/2 SC	1/2 SC	1/2 SC	1/2 SC
TOTAL MAN-MONTHS												
Professional	2	2	2	2	2	2	2	2	2	2	2	2
Clerk-Steno	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/4	1-3/4	1-3/4	1-1/2	1-1/2	1-3/4	1-1/2

PROJECT LABORATORY

The Salt Lake City Laboratory provides analytical results to Denver Engineering Studies Unit as they are completed. When questions arise as to progress or status of certain analytical results, the laboratory is contacted for clarification. Periodic visits are made by laboratory personnel to Project Headquarters and by Project Director and Chief, Engineering Studies Unit to the laboratory to coordinate efforts.

The laboratory currently has a backlog of work. The backlog will have no serious effects on preparation of material either for the Conference or for forthcoming reports.

Manpower Time Budget
Fiscal Years 1963 and 1964

Organic Chemistry Section

1. It has been requested that personnel planning in terms of recognized projects be outlined for the remainder of fiscal year 1963 and all of fiscal year 1964. On the basis of a similar plan by the Project office, an estimate of manpower usage on three projects has been made.

2. The attached shows a breakdown of manpower in terms of 3 persons. Each project is divided into Lab work and Reports and Planning. Any field work by these personnel would be shown under Lab work. All necessary development work for various known substances is charged directly to the related project.

3. It is assumed that two follow-up studies in Lake Mead might be considered for October-November of 1964 and April-May of 1965.

4. It is considered that the major effort will be devoted to pesticide studies since the number of pesticides is large and the expected concentrations are quite low. Identification studies will be time-consuming.

5. Industrial organic contamination studies have been added to include the additional studies of American Gilsonite Company effluent. One man-month has been allotted to any industrial studies in fiscal year 1964.

Organic Chemistry Section

Fiscal Year 1963

	J	F	M	A	M	J	Total Man-Months
Organic contaminants in Lake Mead; recreational pollution studies							
Lab Work		<----------2-3.6---------->					7.2
Reports and Planning	<1-0.2>						0.2
Organic contaminants in waters studied related to salinity in the Basin							
Lab Work	<----------3-3---------->						9.0
Reports and Planning	<----------1-1---------->						1.0
Industrial organic contamination studies							
Lab Work		<2-0.25>					0.5
Reports and Planning		<1-0.1>					0.1
LEAVE							0.5
							18.5

Organic Chemistry Section

Fiscal Year 1964

	J	A	S	O	N	D	J	F	M	A	M	J	Total Man-Months
Organic contaminants in Lake Mead; recreational pollution studies													
Lab Work				<--2-2.15--->						<-----2-2------>			8.3
Reports and Planning	<1-0.1>	<1-0.2>			<1-0.1>			<1-0.2>			<1-0.1>		0.7
Organic contaminants in waters studied related to salinity in the Basin													
Lab Work	<----------3-7---------->												21.0
Reports and Planning	<----------1-2---------->												2.0
Industrial organic contamination studies													
Lab Work					<---3-0.33--->								1.0
LEAVE													2.5
													35.5

Manpower Time Budget
Fiscal Years 1963 and 1964

Radiochemistry Section

The Radiochemistry Section expects to expand the number of radiochemical parameters determined to provide more detailed information on the radionuclide burden of the Basin waters and sediments and of the uptake of the nuclides by terrestial and aquatic biota.

Radiochemistry Section

Fiscal Year 1963

	J F M A M J	Total Man-Months
Radium Monitoring Network	<----------6-3.0---------->	18
Field Surveys	<----------5-0.4---------->	2
Crop Surveys	<----------5-0.6---------->	3
Basinwide Sediment Survey	<----------5-0.4---------->	2
Other than WSPC (DRH, OHFS, States)	<----------2-0.5---------->	1
WSPC - SEC	<----------5-2.0---------->	10
Biota Study	< None >	None
		36

Radiochemistry Section

Fiscal Year 1964

	J	A	S	O	N	D	J	F	M	A	M	J	Total Man-Months
Radium Monitoring Network	<----------7-6.0---------->												42
Field Surveys	<----------7-1.0---------->												7
Crop Surveys	<----------7-1.0---------->												7
Basinwide Sediment Survey	<----------6-1.0---------->												6
Other than WSPC (DRH, OHFS, States)	<----------2-1.0---------->												2
WSPC - SEC	<----------6-2.0---------->												12
Biota Study	<----------4-2.0---------->												8
													84

PROJECT LABORATORY

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Manpower Time Budget
Fiscal Years 1963 and 1964

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Organic Chemistry Section

Fiscal Year 1963

	J	F	M	A	M	J	Total Man-Months
Organic contaminants in Lake Mead; recreational pollution studies							
Lab Work		<----------2-3.6---------->					7.2
Reports and Planning	<1-0.2>						0.2
Organic contaminants in waters studied related to salinity in the Basin							
Lab Work	<----------3-3---------->						9.0
Reports and Planning	<----------1-1---------->						1.0
Industrial organic contamination studies							
Lab Work		<2-0.25>					0.5
Reports and Planning		<1-0.1>					0.1
LEAVE							0.5
							18.5

Organic Chemistry Section

Fiscal Year 1964

	J	A	S	O	N	D	J	F	M	A	M	J	Total Man-Months
Organic contaminants in Lake Mead; recreational pollution studies													
Lab Work				<--2-2.15--->						<-----2-2------>			8.3
Reports and Planning	<1-0.1>	<1-0.2>			<1-0.1>			<1-0.2>			<1-0.1>		0.7
Organic contaminants in waters studied related to salinity in the Basin													
Lab Work	<----------3-7---------->												21.0
Reports and Planning	<----------1-2---------->												2.0
Industrial organic contamination studies													
Lab Work					<---3-0.33--->								1.0
LEAVE													2.5
													35.5

Manpower Time Budget
Fiscal Years 1963 and 1964

Radiochemistry Section

The Radiochemistry Section expects to expand the number of radiochemical parameters determined to provide more detailed information on the radionuclide burden of the Basin waters and sediments and of the uptake of the nuclides by terrestial and aquatic biota.

Radiochemistry Section

Fiscal Year 1963

	J F M A M J	Total Man-Months
Radium Monitoring Network	<----------6-3.0---------->	18
Field Surveys	<----------5-0.4---------->	2
Crop Surveys	<----------5-0.6---------->	3
Basinwide Sediment Survey	<----------5-0.4---------->	2
Other than WSPC (DRH, OHFS, States)	<----------2-0.5---------->	1
WSPC - SEC	<----------5-2.0---------->	10
Biota Study	< None >	None
		36

Radiochemistry Section

Fiscal Year 1964

	J A S O N D J F M A M J	Total Man-Months
Radium Monitoring Network	<----------7-6.0---------->	42
Field Surveys	<----------7-1.0---------->	7
Crop Surveys	<----------7-1.0---------->	7
Basinwide Sediment Survey	<----------6-1.0---------->	6
Other than WSPC (DRH, OHFS, States)	<----------2-1.0---------->	2
WSPC - SEC	<----------6-2.0---------->	12
Biota Study	<----------4-2.0---------->	8
		84

Manpower Time Budget
Fiscal Year 1963

Biology Section

1. Work will be continued on the backlog of samples collected during past surveys. This consists of about 80 plankton samples, mostly from Taylor Park and Granby Reservoirs, the Colorado River at Grand Junction, and the Gunnison River. All bottom animal samples previously collected have all be sorted to order but approximately 130 samples need further identification. A purchase agreement already in effect with the University of Utah will take care of about half of these samples. The remainder can be processed by an additonal purchase agreement in Fiscal Year 1964.

2. Reports on a number of biological investigations conducted during calendar year 1962 are in preparation. The Animas-La Plata-San Juan report and the Moose Creek Insect Control Project report will be completed in January. The Green River Fish Eradication report and reports on two reimbursable projects, Dallas Creek and San Miguel, should be completed during this fiscal year. Reports on the Gunnison River, the Colorado River at Grand Junction, and the Dolores-San Miguel at Uravan will probably be carried over to Fiscal Year 1964.

3. Limited bottom animal studies will be conducted in the Colorado River below the Gilsonite plant, in the Dolores-San Miguel at Uravan and in the Green River above Flaming Gorge Reservoir. These are all areas in which some additional information is needed and studies should be conducted during the low water period, probably in March.

4. Bacteriological and biological studies will be conducted in Lake Mead and in the Parker Dam area, probably during April.

5. A planned study which has received little attention to date is the uptake of radium and other nuclides by the aquatic biota. Samples of fish have been collected from the Green River for this purpose. It is expected that additional samples will be collected for this purpose from Lake Mead, the lower Colorado River, the Colorado River in the Grand Junction area, and the Dolores-San Miguel Rivers during this fiscal year. Similar studies in other areas will be continued during Fiscal Year 1964. Information on fish populations and fisheries will also be obtained.

6. Laboratory operations will continue, including plankton counting, bottom organism processing, and bioassays. Bioassays will mostly consist of developing background toxicity information on commonly used pesticides and on metals found to be significant in acid mine drainage.

Biology Section

Fiscal Year 1963

	J F M A M J	Total Man-Months
Completing reports (Green River Fish Eradication, Uncompaghre and San Miguel Rivers)	<---------- 1-3 ---------->	3
Laboratory Operations (Plankton, bottom animals, bioassays, including backlog)	<----------> 3-3 <------>	9
Lake Mead Studies	<---- 4-1 ---->	4
Other field studies (Green River, Dolores-San Miguel, etc.)	<--- 2-0.5 --->	1
Biota Uptake Studies (Lower Colorado, Grand Junction, Dolores-San Miguel)	<--------- 3-2 --------->	6
		23

Manpower Time Budget
Fiscal Year 1964

Biology Section

1. It is expected that biological reports on the Gunnison River, Colorado River at Grand Junction, Dolores-San Miguel at Uravan, and Lake Mead will be completed during Fiscal Year 1964.

2. Bacteriological and biological investigations will be carried out in conjunction with other Project field studies. It is expected that the major part of this work will be in the Green River and tributaries, the upper Colorado River, and the San Juan River.

3. Radium uptake in aquatic biota and fishing studies will be continued. It is expected that the major areas of investigation will include the Gunnison, Animas, San Juan, Green, and upper Colorado Rivers.

4. Laboratory studies will continue, including plankton counting, bottom animal processing, and bioassays. Additional toxicity information will be developed on potential pollutants within the Basin, including pesticides, metals, industrial wastes, and possibly mixtures of salts expected from irrigation return waters. It will be necessary to renew the purchase agreement with the University of Utah for bottom animal identification.

5. It is expected that some biological investigations will be made in connection with reimbursable projects and interstate pollution investigations.

Biology Section

Fiscal Year 1964

	J	A	S	O	N	D	J	F	M	A	M	J	Total Man-Months
Completing reports (Gunnison River, Grand Junction, Dolores-San-Miguel, Lake Mead)	<---->		1-6 1-2		<---------->								8
Field studies (Bacteriological and biological investigations--Green R. and tributaries, San Juan R., Upper Colorado River)		<---------->					4-3		<---------->				12
Laboratory operations (Plankton counts, bottom animals, bioassays)	<----------3-3---------->												9
Biota Uptake (Gunnison R., Animas R. San Juan R., Green R.)	<---------->					3-3				<---------->			9
Administration (Planning, consultation, etc.)	<----------2-1---------->												2
Special studies (Flow regulation, interstate pollution)	<----------2-2---------->												4
													44

Manpower Time Budget
Fiscal Year 1963

Inorganic Chemistry Section

The items listed below represent the planned activities of the Inorganic Chemistry Section during the remainder of Fiscal Year 1963:

1. Samples collected from 22 Water Quality Network stations through April 1963 will be analyzed by June 30, 1963.

2. Analysis requirements for the Radium Monitoring Network are based on samples from five stations.

3. Trailer setup, transportation, and field work for the Lake Mead survey in April 1963 will require two men for four weeks. Analysis of composite samples will be done later in the Salt Lake City laboratory.

4. A proposed recheck of specific areas around uranium mills will require the analysis of a number of samples for toxic metal concentrations.

4. Ground water surveys in areas in the vicinity of irrigation projects will require an analytical load proportional to that in the first half of the 1963 Fiscal Year.

6. The analysis of samples anticipated from flow regulation studies is estimated on the low side.

7. An undetermined amount of work for the Sanitary Engineering Center, Cincinnati, has been estimated--based on past requests.

8. The inadequacy of current analytical standard and proposed methods of analysis in determining the concentrations of various metals in mine-waste samples has resulted in some delay in getting answers. Typical mine-waste samples will be used in a laboratory study of modification of methods and sample pre-treatment.

Inorganic Chemistry Section

Fiscal Year 1963

	J F M A M J	Total Man-Months
Water Quality Network-- Analyses	<---------- 1-4 ---------->	4
Radium Monitoring Network-- Analyses	<---------- 1-1 ---------->	1
Lake Mead Survey Field SLC Lab	<-2-1-> <--1-2-->	2 2
Recheck--below Uranium Mills	<-------- 2-1.5 -------->	3
Ground Water Surveys	<---------- 1-2 ---------->	2
Flow Regulation Studies	<---------- 1-2 ---------->	2
Assistance to Cincinnati (Dr. Tsivoglou)	<-------- 1-2 ---------->	2
Outfit Portable Laboratory Trailer	<-- 4-0.1 -->	0.4
Adaptation of Available Analytical Methods--for Use on Mine- Waste Samples	<---------- 4-0.9 ---------->	3.6
LEAVE		2
		24

Manpower Time Budget
Fiscal Year 1964

Inorganic Chemistry Section

The items listed below represent the planned activities of the Inorganic Chemistry Section for Fiscal Year 1964:

1. An anticipated analytical load resulting from a probable Water Quality Network to be established in the Green or San Juan River Basins.

2. These analytical requireemtns for the Radium Monitoring Network are based on samples from five stations.

3. Surveys of the ground water conditions in, and adjacent to, areas of heavy irrigation will require an analytical load proportional to that experienced in the past.

4. This portion of the 1964 program is based on the proposed basin-wide salinity study. It will include operations in the portable trailer laboratory and in the Salt Lake City l atory.

5. The analytical load from samples collected for flow regulation studies is estimated and based on past requirements.

6. An undetermined amount of work for the Sanitary Engineering Center, Cincinnati, is conservatively estimated at two man-months.

Inorganic Chemistry Section

Fiscal Year 1964

	J	A	S	O	N	D	J	F	M	A	M	J	Total Man-Months
Water Quality Network-- Analyses	<---------- 1-4 ---------->												4
Radium Monitoring Network-- Analyses	<---------- 1-2 ---------->												2
Ground Water Surveys	<---------- 2-2.5 ---------->												5
Investigation of Source and Quantity of Salinity													
Field	<---------- 3-3 ---------->												9
Lab	<---------- 4-4 ---------->												16
Flow Regulation Studies	<---------- 2-3 ---------->												6
Assistance to Cincinnati (Dr. Tsivoglou)	<---------- 1-2 ---------->												2
LEAVE													4
													48

ACCOMPLISHMENTS AND LONG RANGE PLANS

List of Project Reports and Other Publications

Published Reports

Number	Title	Date of Publication
PR-1	A Study of Colorado River Water Quality near Yuma, Arizona	June 1961
PR-2	Stream Surveys in Vicinity of Uranium Mills - I. Area of Grand Junction, Colorado - August 1960	Sept. 1961
PR-3	Stream Surveys in Vicinity of Uranium Mills - II. Area of Moab, Utah - August 1960	Sept. 1961
PR-4	Stream Surveys in Vicinity of Uranium Mills - III. Area of Uravan, Slick Rock, and Gateway, Colorado - August 1960	Sept. 1961
PR-5	A Preliminary Investigation of Radioactivity in Crops and Soils of Selected Areas	Oct. 1961
BD-1	State and County Area Tabulations for the Colorado River Basin	Jan. 1962
BD-2	1960 Directory of Manufacturers for the Colorado River Basin	Jan. 1962
BD-3	River Mileage Tabulations for the Colorado River Basin - Communities and Major Tributaries	Feb. 1962
BD-4	1960 Directory of Mining for the Colorado River Basin	May 1962
None	Discussion of an Economic Base Study for the Colorado River Basin Water Quality Control Project	May 1961
ER-1	A Preliminary Economic Base Study of the Animas-La Plata Pilot Project Watersheds in the Four Corners Area of the Colorado River Basin	July 1962
ER-2	The Purpose and Plan of an Economic Base Survey of the Colorado River Basin	Jan. 1963

Number	Title	Date of Publication
DR-1	Radium Monitoring Network - Data Release No. 1	Oct. 1962
DR-2	Radium Monitoring Network - Data Release No. 2	Jan. 1963

Reports In Preparation

Tentative Title	Stage of Preparation	Expected Date of Publication
Land Ownership in the Colorado River Basin (BD-5)	Final draft completed	Feb. 15, 1963
Radioactivity Content of Colorado River Basin Sediments	Out for review	Feb. 15, 1963
Report on Shiprock, New Mexico Uranium Mill Accident-Aug. 1960	In final draft	Mar. 15, 1963
Stream Surveys in Vicinity of Uranium Mills - IV. Area of Shiprock, N.M.- Nov. 1960	Out for review	Feb. 15, 1963
Radioactivity of Crops and Soils on Selected Farms in the Colorado River Basin	In final draft	Mar. 1, 1963
Ground Water Studies in Vicinity of Uranium Mills in the Colorado River Basin	First draft	Mar. 15, 1963
Water Quality Conditions of the Animas-La Plata-San Juan Rivers	First draft	May 30, 1963
Preliminary Investigation of Selected Water Quality Conditions in the Lower Colorado River	Out for review	Feb. 15, 1963
Final Report on Colorado River Water Quality in the Yuma, Arizona Area	First draft	Apr. 15, 1963
An Annotated Bibliography of Selected References Pertaining to the Effects of Irrigation Practices on Stream Water Quality	In final draft	Mar. 15, 1963
Water Quality Management Program - Animas-La Plata Watersheds	First draft underway	June 30, 1963

Tentative Title	Stage of Preparation	Expected Date of Publication
Report on Water Quality and Use In the Price River Basin	In final draft	Apr. 30, 1963

Articles Submitted for Publication in Technical Journals

The Determination of Radium-226 - A Simplified Emanation Technique, D. E. Rushing, W. J. Garcia, and D. A. Clark, submitted to Analytical Chemistry.

The Determination of Radium-226 in Silicates - A Rapid Isolation Method, D. E. Rushing, W. J. Garcia, and D. A. Clark, submitted to Analytical Chemistry.

Studies on the Effect of Forest Insect Control with Ethylene Dibromide on Water Quality, C. Henderson and E. C. Julian (To be submitted for publication after completion & approval)

Analysis of Project Completion

An estimate of the total project effort by the end of FY 1963, along with a list of subportions of the effort, is summarized below.

Major Item	% Completion
Economic Base Studies	25
Water Quality Management Program	30
Engineering Field Studies	40
Laboratory Work	40
Overall Project Program	35

The principal economic base study activities were unable to begin until FY 1963 because funds were not available until this time. The Associated Rocky Mountain Universities portion will be about 20 percent complete and the U. S. Department of Agriculture portion about 30 percent complete by the end of this year. Considering the work within the project and the contract work, it is estimated that 25 percent of the economic base study will be completed by the end of the present fiscal year.

Personnel of the water quality management program carried out much of the load of the engineering field studies during FY 1961. Therefore, the Water Quality Management program was limited primarily to the collection of inventory data, setting up the computer analysis of U. S. Geological Survey water quality data and planning for the

economic base survey. A major part of the Water Quality Management personnel time in FY 1963 was spent in preparation of flow regulation studies for the Bureau of Reclamation and Corps of Engineers. A considerable portion of essential background data has now been developed and the writing of the six water quality management program reports will begin in FY 1964. It is anticipated that the entire Colorado River Basin will be completed by the end of FY 1967.

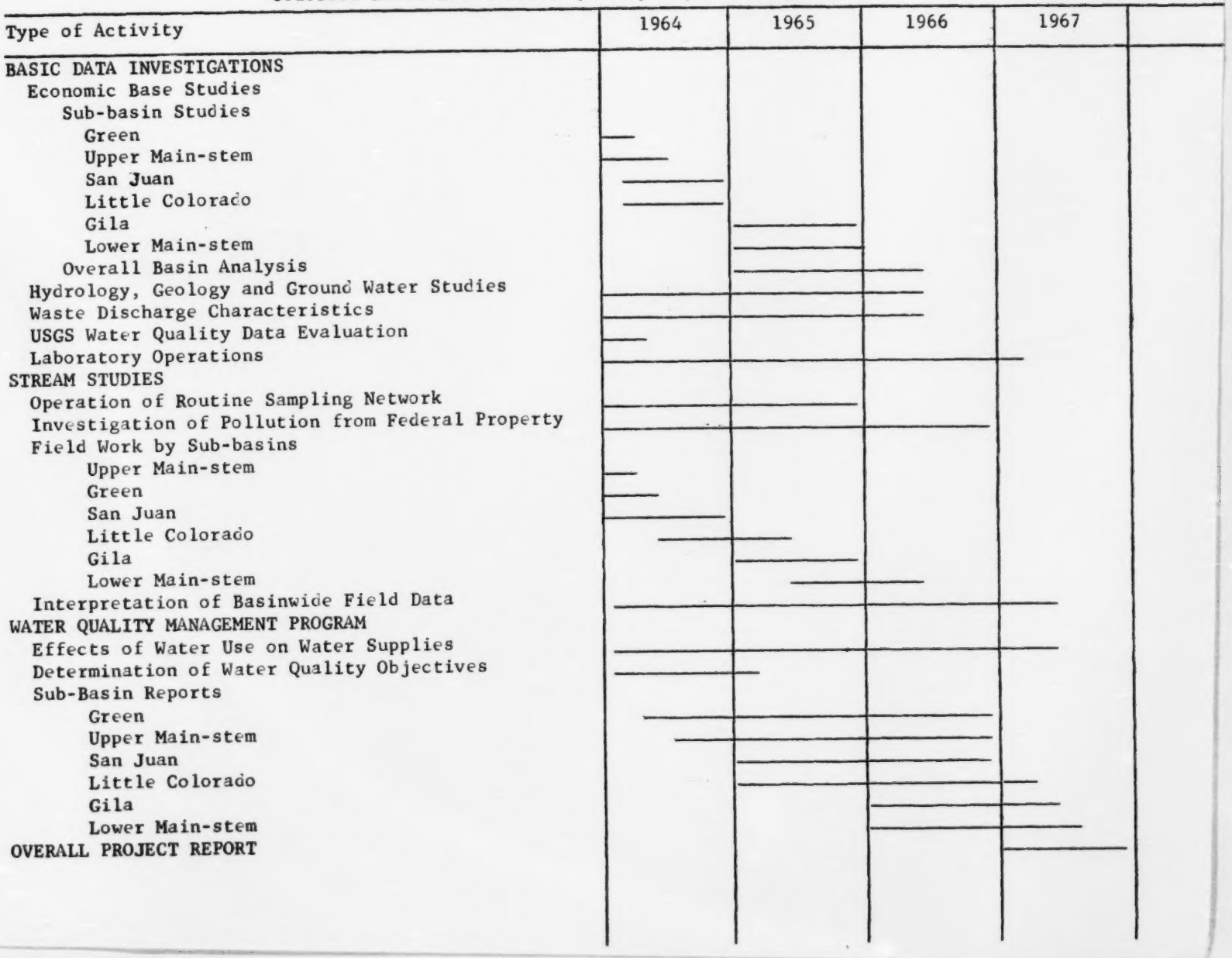
The primary emphasis of the project during FY 1961 and FY 1962 was the solution of the problem of radioactivity in water which existed in the basin. Considerable engineering field work was devoted to this problem. Beginning in FY 1962 and continuing in FY 1963 the field activities were expanded to fill the requirements of the Water Quality Management program and to examine existing nonradiological problem areas. Examples of these investigations are the survey in the Animas-La Plata and the initiation of the salinity studies in the Upper Main-Stem. Beginning in FY 1964 activities will be oriented more to the study of the salinity problem in addition to continuing the radiological monitoring and studies required for the Water Quality Management program. The engineering field studies for these activities are expected to be completed by the end of FY 1966 with the completion of reports of these studies by the middle of FY 1967.

The laboratory workload is tied directly to the activities of the engineering field studies. The project laboratory installation was begun in FY 1961 and completed the middle of FY 1962.

Overall, the Colorado River Basin Project work is estimated to be 35 percent completed. Completion is expected by the end of FY 1967. This target date is reasonable and will be met provided that the level of budget support on which this time estimate is based can be met.

SCHEDULE OF PROJECT ACTIVITIES

Colorado River Basin Water Quality Control Project



Colorado River Basin Water Quality Control Project

Budget Analysis - FY 1965

	Office of Proj. Dir.	Water Quality Mgmnt.	Eng. Studies	Economic Studies	Project Lab.	Total	Flow Reg.	Total
INTERNAL (FY 1965 minus external expenses)	$ 65,888	$ 52,905	$104,405	$ 29,807	$246,104	$499,109	$ 46,175	545,284
EXTERNAL								
Contracts for Investigations or Services								
U. S. Geological Survey			1,000			1,000		1,000
U. S. Dept. of Agriculture				20,000		20,000		20,000
University of Utah (Bio. Ident.)					2,000	2,000		2,000
ARMU				80,000		80,000		80,000
Sample Collection by Private Citizens			18,000			18,000		18,000
Laboratory Laundry Services and Gas Cylinder Rental					1,200	1,200		1,200
Laboratory Instrument Maintenance Contracts					1,000	1,000		1,000
Reimbursements to Other Federal Agencies								
GSA - Vehicle Rental	600	100	9,000		1,500	11,200	1,500	12,700
Transfers to Other PHS Units								
Federal Employee Health Unit	300					300		300
Radiological Health or SEC (Automatic Data Processing)		2,500				2,500		2,500
TOTAL	$ 900	$ 2,600	$ 28,000	$100,000	$ 5,700	$137,200	$ 1,500	$138,700

Colorado River Basin Water Quality Control Project
Budget Analysis - FY 1965

(continued)

Object Class		Office of Proj. Dir	Water Quality Mgmnt.	Eng. Studies	Economic Studies	Project Lab.	Total	Flow Reg.	Total
	Personal Services and Benefits								
11	Personnel Compensation	$ 47,625	$ 33,403	$ 62,282	$ 26,411	$186,663	$356,384	$ 23,865	$280,249
12	Personnel Benefits	7,363	7,902	15,523	1,036	16,041	47,865	6,210	54,075
	Contractual Services and Supplies								
21	Travel and Transportation of Persons	5,000	4,800	18,800	1,500	12,500	42,600	8,400	51,000
22	Transportation of Things	700	1,500	10,500		3,800	16,500	1,500	18,000
23	Rent, Communications, and Utility Services	4,200				2,500	6,700		6,700
24	Printing and Reproduction	300	800	2,000	500	800	4,400	1,200	5,600
25	Other Services	500	6,500	19,400	100,000	4,500	130,900	3,000	133,900
26	Supplies and Materials	600	600	1,400	360	17,000	19,960	500	20,460
	Acquisition of Capital Assets								
31	Equipment	500		2,500		8,000	11,000	3,000	14,000
	TOTAL	$ 66,788	$55,505	$132,405	$129,807	$251,804	$636,309	$ 47,675	$683,984